Conventional wisdom in tort law maintains that the prevention of undesirable risks mandates restriction of harmful conduct. Against this widely held conviction, this Article shows that undesirable risks often stem from insufficient, rather than excessive, activity. Because negligence only requires investments in cost-justified care, parties might deliberately limit their activity so that the size of the ensuing risk would be lower than the cost of welfare-enhancing precautions. Parties’ incentives to strategically restrict their activity levels have striking implications for the inducement of efficient harm-prevention. The overlooked paradigm of insufficient activity calls for the imposition of a new form of tort liability, justifies the application of controversial regulatory rules currently being challenged before the Supreme Court, and supports overturning the standard guidelines concerning the choice between negligence and strict liability.
Harm prevention, as tort literature has long shown, may take two forms. First, potential risks can be reduced by investments in care. For example, drivers may decrease the likelihood of accidents by driving more slowly; railroad companies can lessen the possibility of setting crops on fire by installing spark arresters; and factories can reduce pollution by using filters. Second, since investments in care may not entirely eliminate the risk of harm, drivers, railroad companies and factories can also reduce risks by lowering the level of their activities. Less driving, for example, just like careful driving, diminishes the probability of car accidents. In an ideal world, therefore, tort-law rules would induce parties to behave optimally with respect to levels of both care and activity. Legal scholarship, however, has shown that in practice tort law often only provides incentives for optimal care. In a typical lawsuit for negligence and insufficient activity.
NEGLIGENCE AND INSUFFICIENT ACTIVITY

Negligence driving, for example, courts usually explore the extent to which the defendant-driver took reasonable precautions (level of care). They do not, however, investigate whether the defendant’s mileage (level of activity) corresponds to the socially desirable level. A defendant who drives at an unreasonable speed may well be found negligent. In contrast, a defendant who avoids speeding—but whose driving provides little social benefit, thus creating unnecessary risk—will likely avoid any liability. Defendants will therefore avoid speeding, but drive even when the expected harm they inflict on others outweighs their own benefit.

More generally, legal theory has argued that parties subject to reasonable-behavior regimes (such as negligence) will make efficient and activity levels have largely followed Shavell’s analysis. See infra note 17 (presenting the wide tort literature on care and activity levels).

4 “In practice … it is usually not feasible to include the level of participation in the activity as an aspect of the standard of care. For example, it would be virtually impossible for a court to determine how many miles a particular person drives each year.” Polinsky, supra note 1, at 53; Richard Craswell, Deterrence and Damages: The Multiplier Principle and its Alternatives, 97 Mich. L. Rev. 2185, 2226-27 (1999) (“negligence regimes often do not give defendants any direct incentive to constrain their levels of activity. Negligence regimes can easily condition liability on whether a driver was exercising appropriate care, and this gives drivers an incentive to choose their care appropriately. But such regimes rarely condition liability on whether a defendant drove with unnecessary frequency (probably because of the difficulty of determining a ‘reasonable’ frequency), so they give drivers no incentive to limit their total amount of driving.”). For more discussion on courts’ ability to consider activity levels when deciding negligence cases, see infra text accompanying notes 67-75.

This point is famously illustrated in Warren A. Seavey’s classic example: “if you kidnap a child and, while driving carefully away with it, run down a pedestrian, you will not be liable in negligence for the pedestrian’s injury.” William M. Landes & Richard A. Posner, The Economic Structure of Tort Law 67 n.22 (1987); Warren A. Seavey, Mr. Justice Cardozo and the Law of Torts, 29 Colum. L. Rev. 20, 34 (1939). Because courts focus on the element of care in deciding negligence cases, once an individual has invested in efficient precautions, they will fail to discourage her from driving even when the social utility from her driving is insufficient to outweigh the expected costs of accidents (as in kidnapping).

investments in precautions, but then over-engage in their conduct. As Professor Steven Shavell has recently argued, under the negligence standard, “injurers will be led to take optimal care . . . Because they will take due care, however, injurers will escape liability for any accident losses they cause. They will therefore have no reason to consider the effect that engaging in their activity has on accident losses. Consequently, injurers will be led to choose socially excessive activity levels.” Applying this analysis, scholars have demonstrated the risk of parties engaging in excessive activity across different tort-related areas.

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8 See, e.g., John C. Coffee, Gatekeeper Failure and Reform: The Challenge of Fashioning Relevant Reform, 84 B.U. L. Rev. 301, 308-11, 347 (2004) (explaining the risk of excessive activity levels of gatekeepers); Kevin R. Pinkney, Putting Blame Where Blame is Due: Software Manufacturer and Customer Liability for Security-Related Software Failure, 13 Alb. L.J. Sci. & Tech. 43, 79 (2002) (discussing excessive activity levels of software manufacturers); Note, The History and Economics of ISP Liability for Third Party Content, 88 Va. L. Rev. 205, 240 (2002) (addressing the risk of excessive activity levels of Internet Service Providers (ISP) and explaining that “because a negligence rule will not impose liability for those injuries that could not efficiently be prevented, the ISP's activity level will not take into account the social cost of those accidents. Consequently . . . the ISP will sell too many accounts.”); A. Mitchell Polinsky, Strict Liability vs. Negligence in a Market Setting, 70 Am. Econ. Rev. 363 (1980) (demonstrating the risk of excessive activity levels of firms in competitive markets); A. Mitchell Polinsky & Steven Shavell, Should Employees Be Subject to Fines and Imprisonment Given the Existence of Corporate Liability?, 13 Int'l Rev. L. & Econ. 239, 241, 252 (1993) (showing that duty-based corporate liability induces excessive activity levels); Michael Trebilcock & Ralph A. Winter, The Economics of Nuclear Accidents Law, 17 Int'l Rev. L. & Econ. 215, 222 (1997) (referring to the risk of excessive activity by potential injurers in nuclear accidents); Jon D. Hanson & Kyle D. Logue, The First-Party Insurance Externality: An Economic Justification for Enterprise Liability, 76 Cornell L. Rev. 129, 167-68, 170-71 (1990) (discussing the risk of excessive activity levels by consumers and manufacturers—the quantity of products purchased and sold—under different insurance schemes).
This Article, however, suggests that the existing view concerning the effects of negligence on parties’ behavior is incomplete. It shows that while courts’ adjudication and scholars’ analysis have focused on the risk of optimal care and excessive activity levels, they have overlooked the parallel problem of sub-optimal care and insufficient activity levels. Because the risk of harm usually increases together with more activity, maintaining a low level of activity may allow parties to escape a duty to invest in cost-effective precautions. When their benefit from more activity is smaller than the costs of such precautions, parties are likely to restrict their activity even when a higher activity level is more socially desirable. Against the conventional paradigm, therefore, this Article demonstrates that under reasonable-behavior standards parties might deliberately set their activity below (rather than above) the socially desirable level while avoiding efficient care.

To illustrate, consider the case of a polluting factory. In line with the conventional paradigm, a leading tort scholar has recently concluded that “[n]egligence law may be fairly good at examining whether the plant is designed and maintained in a cost-effective fashion.” If a firm that took reasonable abatement steps is certain that there will be no liability for accidental factory pollution, it will have no incentive not to operate the factory at excessively high levels. 9

However, since “courts may be unable to assess whether the scale of the plant is excessive in a social sense,” the factory is likely to over-engage in its activity. 10 Once the factory invests in optimal care and faces no risk of liability, so the argument goes, it will increase its level of production even when its benefit from such an increase is lower than the expected cost of pollution. 11

Against this backdrop, consider the following hypothetical. Assume that a factory may choose among different levels of production and may invest in precautions that would eliminate any possible harm. Assume that the costs of precautions do not depend on the level of production. For example, suppose that the above-mentioned factory can avoid any pollution by elevating its smokestack at a cost of $120.

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10 Id.
11 See also, Jason S. Johnston, Punitive Liability: A New Paradigm of Efficiency in Tort Law, 87 COLUM. L. REV. 1385, 1423 (1987) ("If a firm that took reasonable abatement steps is certain that there will be no liability for accidental factory pollution, it will have no incentive not to operate the factory at excessively high levels.").
Suppose also that the factory can choose between engaging in a low activity level or a high activity level. In the low activity level, the factory’s profits will be $1000, and the harm inflicted on nearby residents will be $110. In the high activity level, where the factory produces more, its profits will increase to $1100, but the harm inflicted on nearby residents will increase to $130.

Under a negligence regime, applying the *Hand* formula, the factory would be liable if it could prevent the harm by investing in cost-effective precautions. In the low activity level, the loss to residents ($110) is smaller than the cost of elevating the smokestack ($120). In the low activity level, therefore, the factory is neither required to raise its smokestack nor is it required to compensate the residents. Consequently, since it will not bear any costs for precautions or liability, the factory’s benefit while operating at low activity will be $1000. In contrast, in the high activity level, the harm to the residents ($130) outweighs the costs of precautions ($120). Looking to avoid paying $130 in damages, the factory must invest $120 in elevating its smokestack. Thus, when operating at high activity, the factory’s benefit includes its profits from production ($1100) less its costs of elevating the smokestack ($120), for a total of only $980. Looking to maximize its payoff ($1000 > $980), the factory would therefore set its activity at the low level. Maximization of social welfare, however, mandates that the factory produce at the high level and also invest in elevating its smokestack. At low activity—where the factory has no duty to invest in precautions and harm materializes—the net social benefit equals $890 (the factory’s $1000 profits from production less the $110 harm to the residents). By contrast, if the factory operates at high activity—where investments in prevention are made and the residents incur no harm—the net social benefit reaches $980 (the

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12 *Mesman v. Crane Pro Services.*, 409 F.3d 846, 849 (7th Cir. 2005) (“Failure to take a precaution is negligent … if the cost of the precaution is less than the probability of the accident that the precaution would have prevented multiplied by the loss that the accident if it occurred would cause”); *Myers v. Dronet*, 801 So. 2d 1097 (La. 2001) (“To determine whether [a person] breached a duty or, in other words, acted unreasonably, courts often use Judge Hand’s *Carroll Towing* balancing test, most commonly referred to as the ‘Hand formula.’”); JAMES A. HENDERSON ET AL., THE TORTS PROCESS 179 (5th ed. 1999) (“The proper balancing of costs and benefits [of parties’ untaken precautions] has come to be recognized as the central inquiry in determining whether an actor has been negligent.”).
factory’s $1100 profit from the increased production less the $120 cost of the smokestack).\textsuperscript{13}

While courts and scholars have emphasized parties’ incentives to optimally invest in precautions and engage excessively in activities, the polluting factory hypothetical demonstrates that the risk of inefficient behavior might be in the opposite direction. Negligence-based regimes may induce parties to engage too little in a socially desirable activity and forgo investments in efficient prevention. Looking to avoid a duty of care, parties may strategically restrict their activity below the socially desirable level so that the magnitude of the ensuing risk will be lower than the costs of welfare-enhancing precautions. As the following analysis shows, the risk of such conduct may arise under various contingencies and in a wide set of cases.

The overlooked paradigm of insufficient activity and sub-optimal care has important normative implications. Conventional legal

\textsuperscript{13} The following table summarizes the expected costs and benefits under a negligence regime for both activity levels:

<table>
<thead>
<tr>
<th>Activity Level</th>
<th>Plant’s Profits</th>
<th>Harm to Neighbors</th>
<th>Costs of Precaution</th>
<th>Plant’s Net Benefit</th>
<th>Social Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td>$1000</td>
<td>$110</td>
<td>$120</td>
<td>$1000</td>
<td>$890</td>
</tr>
<tr>
<td>High</td>
<td>$1100</td>
<td>$130</td>
<td>$120</td>
<td>$980</td>
<td>$980</td>
</tr>
</tbody>
</table>

As the table shows, while production at the high activity level is socially desirable, the plant maximizes its private gains by operating at the low activity level. Absent transaction costs, the neighbors may attempt to “bribe” the plant to elevate the smokestack and produce at the high level. Since in this case the risk of pollution is removed, neighbors’ benefit will be $110. As for the plant, elevating the smokestack and producing at the high level diminishes its profits by $20 ($1000-$980). Accordingly, any payment between $20 and $110 will make both parties better off and social welfare will be maximized. In the context of tortious behavior, however, transaction costs are prevalent and often prohibitive. Such transaction costs usually take two forms. In many cases, negotiation is infeasible since potential harm-doers cannot identify their potential victims ex ante; in other cases, the large number of parties makes negotiation especially costly. For discussion of other possible transaction costs in the pollution context, see, for example, Ward Farnsworth, \textit{Do Parties to Nuisance Cases Bargain After Judgments? A Glimpse inside the Cathedral}, 66 U. Chi. L. Rev. 373 (1999) (examining twenty nuisance cases and finding no bargaining between the parties).
scholarship, addressing the risk of inefficient activity levels, has proposed several recommendations as to the design of regulations and the choice between liability regimes.\textsuperscript{14} It has thus claimed to provide both legislatures and courts with clear guidelines for inducing optimal prevention. Yet, given the literature’s focus on the risk of excessive conduct, it has failed to consider parties’ possible incentives to undesirably limit their activity. This Article, aiming to rectify this gap, reassesses the conventional recommendations and elaborates on the ways in which the legal system can discourage parties from restricting their activity and avoiding efficient investment in precautions.

The discussion of this Article unfolds as follows. Part I presents the conventional wisdom regarding care and activity levels. It first sets out the traditional prediction of optimal care and excessive activity, and then discusses the normative consequences of this prediction. Part II claims that the standard analysis concerning the interplay between care and activity levels is incomplete. It establishes that tort rules may often induce sub-optimal care and insufficient activity. The risk of such behavior, it is shown, has been overlooked by judges, scholars and the new \textit{Restatement of Torts}. Part III argues that the legal system can discourage parties from setting their activity below the efficient level and can minimize the social loss that may result from such conduct. First, tort law may remove parties’ incentives to restrict their activity and avoid efficient precautions by allowing liability for insufficient activity. Under this new form of liability, parties who engage in such behavior will be considered negligent and be required to compensate for the harm they cause. Second, in contexts where such an inquiry by the courts is likely to be costly, regulation setting either pre-specified safety standards or maximum-harm ceilings can be used to prevent deliberate restrictions of parties’ activity levels. This insight provides a novel justification for a highly contested form of regulation currently being challenged before the Supreme Court. Finally, the conventional paradigm of optimal care and excessive activity has led to important policy recommendations as to the choice between different liability regimes. The overlooked paradigm of sub-optimal care and insufficient activity implies that in many cases, these policy

\textsuperscript{14} See \textit{infra}, Part I.B.
recommendations may be flipped: in situations where negligence was conventionally believed to be superior to strict liability (or vice versa) the opposite may in fact be true.

The current tort system has been criticized on the basis of two theories that are usually perceived as incompatible. On the one hand, pro-defendant critics often complain that existing liability rules are too harsh. In their view, the tort system creates too much deterrence and stifles, rather than encourages, activities that are welfare-enhancing. On the other hand, pro-plaintiff critics contend that liability rules are too lenient. According to their claims, the tort system fails to provide suitable protection for potential victims and allows injurers to expose others to unjustifiable risks. This Article argues that both of these apparently opposing claims often manifest two sides of a single deficiency of the tort system. The Article shows that current tort liability stimulates both insufficient activity and sub-optimal care. It further demonstrates how tort rules can be modified to alleviate both problems.

I. THE CONVENTIONAL PARADigm: OPTIMAL CARE AND EXCESSIVE ACTIVITY

The preceding factory hypothetical established that, under a rule of negligence, a potential injurer might strategically restrict her activity

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16 See, e.g., Galligan, supra note 15, at 695-721 (claiming that in many areas tort law provides insufficient protection to potential victims); Robert S. Peck et al., Tort Reform 1999: A Building Without a Foundation, 27 FLA. ST. U. L. REV. 397, 400-01 (2000) (“[T]he recent demands for widespread tort reform, while directing attention to dissatisfaction with the tort system, tend to miss their mark, since significant underdeterrence already exists.”).
in order to save the costs of care. In contrast, conventional tort analysis has claimed that negligence-based regimes are likely to have the opposite effect: parties will be incentivized to adopt efficient precautions but then engage in excessive activity levels. The actual incentives to over-engage in an activity, it has been argued, depend on the applicable regime—a rule of negligence would induce injurers to over-engage in activities, whereas victims would over-engage under a regime of strict liability with contributory negligence.\(^\text{17}\) Tort scholarship has proposed several policy recommendations to address this risk of excessive activity levels. Section A demonstrates the reasoning underlying the conventional arguments. Section B presents the related normative recommendations.

\textit{A. Reasonable-Behavior Standards and the Incentives for Excessive Activity}

Legal scholarship has shown that negligence-based regimes are crucial for inducing optimal investments in precautions but may provide only partial incentives for efficient activity levels—the activity of either the injurer or victim will often exceed the socially desirable level.\(^\text{18}\)

\(^{17}\) For the conventional analysis concerning the risk of excessive activity levels under negligence and strict liability, see, for example, STEVEN SHAVELL, \textit{ECONOMIC ANALYSIS OF ACCIDENT LAW} 9-47 (1987) (demonstrating the risk of excessive activity under both negligence and strict liability regimes); LANDES \& POSNER, \textit{supra} note 5, at 66-73 (1987) (discussing the care-activity distinction and arguing that tort law usually induces optimal levels of care but also excessive activity levels on the part of either the victim or the injurer); ROBERT COOTER \& THOMAS ULEN, \textit{LAW \& ECONOMICS} 332-33 (4th ed. 2004) (explaining that given courts’ focus on care, both negligence and strict liability induce parties to engage in their activities beyond the socially desirable level); THOMAS J. MICELI, \textit{THE ECONOMIC APPROACH TO LAW} 66-68 (2004) (showing that under any form of tort liability either the victim or the injurer might over-engage in its activity); DAVID D. FRIEDMAN, \textit{LAW’S ORDER: WHAT ECONOMICS HAS TO DO WITH LAW AND WHY IT MATTERS} 197-206 (2000) (illustrating victims’ and injurers’ incentives to engage in excessive activity levels under regimes of negligence and strict liability).

\(^{18}\) For the first extensive analysis establishing that only negligence-based regimes can induce optimal levels of care, see John Prather Brown’s seminal
Consider parties’ incentives to invest in care. Imagine a potential injurer who may unilaterally prevent harm—her behavior may cause damage of $100 but she can prevent such damage by investing $50 in precautions. Subjecting this potential injurer to either strict liability or a rule of negligence would induce her to invest in efficient harm avoidance. As the potential injurer is better off incurring a cost of $50 rather than $100, she will prefer to invest in prevention rather than pay out compensation. In other cases, efficient prevention may require bilateral investment by both the injurer and the victim. For example, assume a situation where an investment of $20 by each party is required to eliminate a harm of $100. In such situations, a regime of strict liability will not create the necessary incentives for efficient prevention—the victim, always entitled to compensation, will have no reason to invest in precautions. In contrast, a rule of negligence, which imposes liability on the injurer if she fails to invest $20 in precautions, will induce both parties to efficiently invest in precautions. Looking to avoid paying $100 in damages, the potential injurer will prefer to invest $20 in care. Given such behavior by the potential injurer, the potential victim faces a $100 harm for which he is not entitled to compensation. To avoid incurring a loss of $100, the potential victim will thus also invest $20 in precaution.

The rule of negligence described above applies a reasonable-behavior standard with respect to the conduct of the injurer. As tort scholars have emphasized, the same result can be achieved by subjecting the victim (rather than the injurer) to the standard of

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article, John Prather Brown, Toward an Economic Theory of Liability, 2 J. LEGAL STUD. 33 (1973) (showing that only reasonable-behavior rules can encourage optimal investments in precaution in both unilateral and joint-care cases). Subsequent scholarship exploring the efficiency of tort liability regimes has largely followed Brown’s analysis. See, e.g., Shavell, supra note 17, at 54-72; Landes & Posner, supra note 5 at, 54-84. As our discussion suggests, however, the conventional model has overlooked the incentives that negligence-based regimes might create for insufficient activity levels and sub-optimal care.

In the same vein, a rule of no-liability (under which the victim shoulders the entire loss irrespective of the injurer’s fault) is inefficient in joint-care cases. Since the injurer bears no liability under all circumstances, she has no incentive to invest in precaution. The regime of no liability induces optimal precaution where efficient prevention requires investments only by the potential victims. See Brown, supra note 18, at 327-35.
This legal regime would take the form of strict liability with contributory negligence, in which a failure on the part of the victim to invest in cost-effective precautions will deny him his right to compensation. Consider again the bilateral situation, in which both parties must invest in care to avoid the harm. The victim will invest $20 in precautions to avoid shouldering the $100 harm; since no contributory negligence is expected, the injurer will also invest $20 to prevent paying $100 in compensation. Thus, whether the situation demands unilateral or bilateral care, reasonable-behavior standards have been shown to induce optimal care by both parties.

Ideally, in evaluating reasonable behavior, negligence-based regimes would not only compare the costs and benefits of potential precautions, but also those of different activity levels. While information concerning precautions is usually available, in practice it is often the case that “the information costs of evaluating activity levels are especially high.” Consequently, in many torts-related contexts, “courts ordinarily exclude activity levels from evaluation.” This neglect, it has been argued, induces parties to over-engage in activities. Under a rule of negligence, injurers will optimally invest in precaution, but then—since they do not face the risk of liability—will excessively perform. Under a rule of strict liability with contributory negligence—where the standard of reasonable behavior is applied with regard to victims’ conduct—the risk of excessive activity is in the opposite direction. Victims will optimally invest in precautions, but then—given that they are always compensated—will over-engage in their activity.

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20 Id.
21 See, e.g., Steven P. Croley & Jon D. Hanson, What Liability Crisis? An Alternative Explanation for Recent Events in Products Liability, 8 YALE J. ON REG. 1, 71 (1991) (“In an ideal negligence regime, courts would alter the activity levels of potential injurers by taking activity levels into account in their negligence determinations. But . . . in practice, courts do not or cannot take activity levels into account in their negligence analyses.”).
22 LANDES & POSNER, supra note 5, at 69-71.
23 Id.
24 "A negligence standard puts pressure on injurers to act with due care because it confronts them with potential liability payments that exceed the cost of taking care. The negligence standard, however, does not give injurers a financial incentive to limit their activity level. Because, under a negligence rule, injurers will not be
A concrete example, employing the classic tort setting of a railroad and a farmer, can demonstrate the traditional prediction concerning optimal care and excessive activity. Following the conventional analysis, this example will employ the standard (though typically not emphasized) assumption that the cost of precaution is the same for each “unit” of activity.

**Hypothetical I – Negligence and the Risk of Excessive Activity**

Imagine that a railroad company operates a train that runs across a farmer’s field. The crossing train emits sparks that may set the crops on fire. Assume that each time fire occurs it inflicts harm of $200, as some of the farmer’s crops are lost. Assume also that the likelihood of emitting sparks depends exclusively on the train’s speed. If the train runs at its maximum speed, the likelihood of fire is 30%; if it runs only at half speed, this likelihood diminishes to 10%. Limiting speed, however, makes the operation of the train more costly. More...
specifically, the cost of operation at the maximum speed equals $1 per ride, as compared to $2 per ride at the reduced speed. Finally, assume that the railroad company can set the number of rides from zero to ten. The benefit to the company from the first ride is $100, the benefit from the second ride is $90, from the third $80 and so forth, such that the benefit from the 10th ride equals $10. Considering these assumptions, investment in precautions—running the train at a lower speed—is efficient. Limiting speed will increase operation costs by only $1 per ride (from $1 to $2). When a train’s speed is limited, the likelihood of fire and of the resulting $200 loss is reduced by 20% (from 30% to 10%), thus saving $40 (20% of $200) in expected harm per ride. Under a rule of negligence, therefore, a failure to curb the train’s speed would render the company liable. Looking to avoid paying compensation, the company will operate its train at the reduced speed.

This investment in care, while reducing the likelihood of harm, does not entirely eliminate the risk of fire. As a 10% risk still remains, the expected harm per ride equals $20 (10% of $200). Nevertheless, taking into account courts’ exclusive focus on care, the railroad company now faces no risk of liability. Because no other efficient precautions are available, the company will not be required to pay for any damage to crops. Looking to maximize its payoffs, the company will determine its activity level only on the basis of its private revenues and operation costs. Since even the benefit from the 10th ride outweighs operation costs ($10 > $2), the company will run all 10 trips. This level of activity, however, exceeds the socially desirable level. As the next table shows, because each ride creates a

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27 Diminishing marginal returns (that is, declining profit for every additional unit of operation) characterizes most behaviors. This generally occurs for two reasons. First, the costs of operation may rise for each additional unit. Second, the benefit from each additional unit is often a decreasing function. See generally, HAL R. VARIAN, INTERMEDIATE MICROECONOMICS: A MODERN APPROACH 227-80, 329 (7th ed. 2006) (explaining the principle of diminishing marginal returns). For example, in our context, one may assume that the first ride, operated during morning rush hours, enjoys the largest occupancy, and hence the largest revenue; the second ride, operated at a less busy hour, enjoys less occupancy and revenue, and so forth. For algebraic simplicity, the discussed hypothetical involves marginal declining benefits while assuming that operation costs are the same for every ride. The analysis, however, would have been identical if we had assumed that operation costs rise for every additional ride.
10% risk of $200 harm the actual social costs per ride equal $22 ($20 expected harm + $2 operation costs). Accordingly, from a social perspective, the railroad company should operate the train only 8 times rather than 10 (given that the benefit from the 9th and 10th rides is only $20 and $10, respectively). This excessive activity by the company results in social waste in the amount of $14 (as the benefits from the ninth and tenth rides equal $30 ($20 + $10) but result in social costs of $44 ($22 × 2)).

The previous example focused on the care and activity level of the injurer. In the same vein, tort scholarship has shown that similar inefficiencies occur where the possible loss is contingent on the victim’s care and activity levels. Consider again the railroad-farmer hypothetical, but assume this time that the farmer can cost-effectively reduce the expected harm—loss of crops—by spraying a certain fire-retardant chemical at the same cost per acre (care) and by confining the size of the field (activity). Subjecting the farmer to a rule of strict liability with contributory negligence will induce her to invest in efficient precautions. The farmer will spray the chemical so that her behavior will not be considered negligent. Yet, as she is now entitled to compensation in the case of fire, and given that having
more crops increases her benefits, the farmer will set the size of her field beyond the socially desirable magnitude. As this analysis shows, while negligence-based regimes induce optimal investments in precautions, they also allow one of the parties to over-engage in her activity. Once taking optimal care, either the injurer or the victim will adopt excessive activity levels.

B. Normative Implications of Excessive Activity Levels

Tort scholarship has proposed two strategies for minimizing the social loss caused by excessive activity levels. First, the legal system may supplement liability with regulation setting a cap on the maximum level of activity. Second, where maximum-activity regulation is unfeasible, the tort system may prevent the loss (or at least reduce it) by choosing whether to apply negligence or strict liability with contributory negligence. Since under each regime the risk of excessive activity lies with a different party (the victim or the injurer), opting for the appropriate form of liability can diminish the actual harm.

1. Maximum Activity Regulation

Litigation usually produces adequate evidence regarding the cost-effectiveness of untaken precautions. The availability of this information thus enables courts to easily determine the optimal level of care. By contrast, determinations of activity levels require more

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28 Mark F. Grady, Untaken Precautions, 18 J. LEGAL STUD. 139 (1989) (“[Courts] take the plaintiff's allegations of the untaken precautions of the defendant and ask, in light of the precautions that had been taken, whether some particular precaution promised benefits (in accident reduction) greater than its associated costs.”); See also, Ehud Gutel, The (Hidden) Risk of Opportunistic Precautions, 93 VA. L. REV. 1389 (2007), 1395-1405 (discussing the efficiency implication of the untaken-precaution approach).

29 “The untaken-precaution approach … reduces courts’ need for information because they no longer have to identify the precautions that produce the global minimum of social costs; they need only examine the costs and benefits of the precautions that the plaintiff has actually alleged that the defendant failed to take. Un-taken precautions beyond the efficient set appear cost-beneficial only when the injurer has used less precaution than due care. When the injurer has used the most
complex information. They mandate identifying the costs and benefits of possible changes in the intensity in which activities are carried out, a task courts may not always be able to perform given their lack of relevant information. Yet regulators, as opposed to courts, are often capable of collecting extensive data. Scholars have thus claimed that regulatory agencies may induce efficient activity levels by setting limits on the extent to which parties may engage in potentially harmful conduct. Professors Ulen and Garoupa, for example, have recently shown that “activity levels in areas such as environmental liability, product liability, consumer policy, and public health are traditionally allocated to state regulation rather than liability.” Regulation may thus supplement tort liability. A regime of negligence combined with a regulatory cap that restricts the frequency of the injurer’s conduct will induce the injurer to adopt both optimal care and optimal activity. Similarly, a regime of strict liability and contributory negligence combined with a regulatory cap on the victim’s conduct will provide the victim with incentives for optimal behavior.

While applied in many contexts, maximum-activity regulation cannot entirely resolve the risk of excessive conduct. First, regulators too may lack information for determining the socially desirable level of efficient precautions, as he has an incentive to do, no further precaution will appear cost-beneficial.” Mark F. Grady, Discontinuities and Information Burdens: A Review of the Economic Structure of Tort Law by William Landes and Richard Posner, 56 GEO. WASH. L. REV. 658, 661 (1988).

For the possible informational hurdles that courts may face in determining the efficiency of activity levels, see, for example, Shavell, supra note 17, at 25-26 (explaining that to determine the efficient activity level in the context of driving, for example, courts must answer the complex questions of how many miles the defendant drives per year as well as what the defendant’s subjective benefits are from driving.).

See, e.g., Kyle Logue & Ronen Avraham, Redistributing Optimally: Of Tax Rules, Legal Rules, and Insurance, 56 TAX L. REV. 157, 240 n.256 (2003) (“with respect to some types of activities and potential injurers, the activity-level question may be dealt with best through licensing or other types of direct regulation, leaving the care-level regulation . . . to the tort law.”).

activity.\textsuperscript{33} Second, because regulation requires the government to invest in ongoing monitoring, high enforcement costs may render the use of regulation impractical.\textsuperscript{34} To the extent that regulation is unfeasible, tort liability is often the only available means for controlling parties’ behavior. Nevertheless, as the next section explains, tort theory has shown that the legal system can diminish the harm from excessive activity levels by choosing the appropriate liability regime.\textsuperscript{35}

2. Negligence, Strict Liability and “The Lesser of Two Evils” Principle

Tort analysis has shown that choosing correctly between negligence and strict liability can minimize the social loss caused by undesirable activity levels. This analysis has distinguished between three possible types of cases. The first category involves cases in which optimal investment in prevention entirely removes the risk of harm. The second category concerns cases in which the risk of excessive activity is unilateral (only one of the parties may engage in excessive activity). In the third category, the risk of excessive conduct is bilateral (both parties’ activity may be excessive). Legal analysis has provided clear guidelines concerning the selection of liability regimes in each of these categories.

\textsuperscript{33} For some concerns about the ability of regulators to collect the necessary information for determining activity levels, see, for example, Steven Shavell, The Optimal Structure of Law Enforcement, 26 J.L. & ECON. 255, 285 (1993) (questioning regulators’ ability to find the information regarding the costs and benefits of activities in certain contexts).

\textsuperscript{34} See, e.g., Clifford Rechtschaffen, Deterrence vs. Cooperation and the Evolving Theory of Environmental Enforcement, 71 S. CAL. L. REV. 1181, 1214 (1998) (“It is certainly true that government resources are constrained... [E]nforcement agencies have never had sufficient staff to inspect more than a fraction of regulated facilities.”).

\textsuperscript{35} Some scholars have claimed that the different effects of negligence and strict liability on parties’ incentives to engage in excessive activity is in fact the most important distinction between these two regimes. See LANDES & POSNER, supra note 5, at 66 (noting that the “most interesting respect in which negligence and strict liability differ concerns the incentive to avoid accidents by reducing the level of an activity rather than by increasing the care with which the activity is conducted.”).
Consider initially the case where efficient investment in precaution makes parties’ behavior entirely safe. To illustrate, imagine in *Hypothetical 1* that once the railroad and farmer take optimal precaution (reduced speed and spraying a chemical) there is no risk of fire. Tort scholarship has shown that in such cases, where parties’ behavior generates no risks, activity will be set at the desirable level. Since parties do not externalize any risk of harm, they bear the true costs of their conduct. Parties’ private incentives are thus fully aligned with social welfare maximization. In the railroad example, because the social costs of its conduct now involve only its own operation costs, the company will set its activity (number of rides) at the efficient level. Most importantly, this result has lead tort theory to conclude that where optimal precaution entirely removes the risk of harm, both negligence and strict liability with contributory negligence are efficient. Since both regimes induce optimal investments in precaution and optimal activity, the legal system can apply either of them to maximize social welfare.36

This equivalence between negligence and strict liability disappears when optimal precaution cannot render parties’ behavior entirely safe. As the preceding analysis has shown, parties in such cases may set their activity at excessive levels. Since they externalize part of the costs involved in their behavior, parties may act even when the private gain they derive from the activity is lower than the harm they inflict on others. Tort theory, however, has claimed that as long as the harm depends on the activity level of only one of the parties, opting for the proper liability regime can remove the risk of excessive activity. To illustrate, consider again *Hypothetical 1*. Imagine that parties’ precautions (reduced speed and spraying the chemical) can efficiently reduce, but not entirely eliminate, the risk of harm, and that the likelihood of fire is contingent only upon the number of rides (and not on the size of the field). In this case, welfare maximization requires inducing optimal care by both parties and controlling the activity level of the injurer-railroad. Recall that negligence, while inducing optimal care, fails to provide the injurer with the necessary incentives to avoid excessive activity. In contrast, strict liability (with contributory negligence) encourages both parties

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36 See, e.g., COTTER & ULEN, supra note 17, at 325-32 (showing that in contexts in which optimal prevention could be achieved by investments in precaution, all negligence-based regimes are equally efficient).
to take efficient precautions and the injurer to set her activity at the efficient level. Tort theory has thus advocated choosing strict liability in such cases. Applying a similar analysis, tort theory has recommended the application of negligence in cases in which the risk of excessive activity lies only on the part of victims.\(^{37}\)

Finally, in some contexts in which efficient precautions do not entirely remove the risk of accidents, expected harm depends on the activity levels of both the injurer and the victim. Accordingly, neither negligence nor strict liability with contributory negligence can induce optimal behavior. Tort scholarship has thus proposed the principle of “the lesser of two evils.”\(^{38}\) To minimize social harm, liability should be imposed such that it induces excessive behavior by the party whose excessive activity is less harmful. More specifically, as scholars have explained:

> “[T]he preferred liability rule depends on whether it is more important to control the injurer’s or the victim’s activity level. If the injurer’s activity level is of greater concern, then strict liability with a defense of contributory negligence should be used. If the victim’s activity level is more important, then negligence is preferable.”\(^{39}\)

To illustrate, recall that in Hypothetical 1 the excessive activity of the railroad company—running 10 rather than only 8 rides—resulted in social waste of $14. The preferred form of liability in this situation will thus depend on whether the social loss from the farmer’s excessive activity (an oversized field) is more or less than $14. If this

\(^{37}\) \textit{Shavell, supra note} 17, at 21-26 (analyzing the efficiency of liability regimes and demonstrating that negligence is optimal if it is necessary to induce an optimal activity level on the part of the potential victim, whereas strict liability is superior if it is necessary to control the activity level of the potential injurer).

\(^{38}\) “The . . . choice between strict liability with a defense of contributory negligence and the negligence rule is a choice in favor of the lesser of two evils.” \textit{Shavell, supra note} 3, at 19.

\(^{39}\) \textit{Polinsky, supra note} 1, at 54. See similarly, \textit{Shavell, supra note} 17, at 29: “[S]trict liability with the defense of contributory negligence will result in higher social welfare if its disadvantage—that victims engage too often in their activity—is not as important as the disadvantage of the negligence rule—that injurers engage too often in their activity.”
loss is greater than $14, it outweighs the alternative loss that results from the railroad’s excessive activity (too many rides). In this case, a rule of negligence—which induces excessive activity on the part of the railroad—is more favorable. If it is less than $14, a rule of strict liability with contributory negligence—which induces excessive activity on the part of the farmer—is preferable. As legal analysis has emphasized, deciding whether to apply negligence or strict liability with contributory negligence does not require knowledge about the exact harm from parties’ excessive activity. It demands only identifying in a given context which party’s excessive activity – either the farmer’s or the railroad’s – is likely to result in greater social harm. Controlling the activity of the side whose excessive activity is more harmful reduces the actual social waste.

II. THE OVERLOOKED PARADIGM: SUB-OPTIMAL CARE AND INSUFFICIENT ACTIVITY

Legal scholarship, addressing the possible interplay between care and activity levels, has shown that tort law as applied in practice may encourage parties to create socially undesirable risks. Since courts impose liability for failures to invest in cost-effective precautions, but usually disregard inefficient activity levels, parties are induced to optimally invest in care and then to engage excessively in their activities. This Part, however, suggests that the conventional analysis is incomplete. Against the standard perception, it shows that the tort system may encourage parties to engage in activities to an extent that is below the efficient level. Because the risk of harm is often a function of the intensity in which an activity is carried out, a low activity level—that reduces the expected harm from the activity—may allow parties to avoid investments in precautions. Several scholars have shown that in some contexts the efficiency of possible

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40 See, e.g., COOTER & ULEN, supra note 17, at 332 (explaining that “[u]sually, one party’s activity level affects accidents more than the other party’s activity level. Efficiency requires choosing a liability rule so that the party whose activity level most affects accidents bears the residual costs of accident harm”).

41 Several scholars have shown that in some contexts the efficiency of possible
investments would enhance social welfare, such behavior involves sub-optimal care and insufficient activity. Section A first illustrates the risk of sub-optimal care and insufficient activity by reconsidering the railroad-farmer hypothetical. Section B then provides a general account of the conditions under which parties may strategically restrict their activity to avoid investments in efficient precaution. In particular, it shows that where the cost of precaution is not the same per unit, the overlooked paradigm of sub-optimal care and insufficient activity may emerge. Finally, section C demonstrates precautions might depend on parties’ actual levels of activity. Because different activity levels might affect the marginal cost or the marginal benefit of taking care, courts might not be able to determine the cost-effectiveness of precautions without first identifying the intensity in which a party engages in an activity. In the context of traffic safety, for example, Professor Donohue has explained that “[a] trucker will presumably find it more difficult to stay alert—that is, more costly to take care—if he has to drive all night as opposed to only a few hours. Furthermore, if the trucker keeps driving through rush-hour traffic, the benefits from heightened care will escalate because of the higher accident risk posed by the greater congestion.” Donohue, supra note 24, at 1062. See also, Jacob Nussim & Avraham D. Tabbach, A Revised Model of Unilateral Accidents, forthcoming INT'L REV. L. & ECON, available at http://ssrn.com/abstract=887101 (discussing medical malpractice and arguing that because doctors’ activity levels in urban areas are higher than those of doctors who work in rural areas, courts deciding whether defendant-doctors are negligent in not taking certain precautions must distinguish between urban and rural doctors). These examples, while emphasizing the possible interdependence between activity and care levels, assume that where courts can determine the actual activity levels, parties will be induced to take optimal care. This assumption, however, overlooks the risk of insufficient activity levels exposed in this Article. For example, even if a trucker takes precaution appropriate to his actual level of activity, a negligence rule may induce him to set his activity below the socially desirable level.

42 Tort scholarship has explored the case of fixed cost precautions (i.e., precautions the costs of which are unaffected by the activity level). This literature, however, has overlooked the risk of insufficient care and sub-optimal care. See, Mark F. Grady, Why Are People Negligent? Technology, Nondurable Precautions, And The Medical Malpractice Explosion, 82 NW. U. L. REV. 293, 302 (1988) (discussing the distinction between fixed cost precautions and non-fixed cost precautions and arguing that courts tend to underestimate the costs of the latter type); Mark F. Grady, Res Ipsa Loquitur and Compliance Error, 142 U. PA. L. REV. 887 (1994) (examining the role of the Res Ipsa Loquitur principle in the context of fixed cost and non-fixed cost precautions); Alan J. Meese, The Externality of Victim Care, supra note 2, at 1216 (showing that when the cost of precaution is not fixed current tort rules may induce over-investment in precaution, while fixed cost precautions induce optimal care and activity levels); Nussim &
the risk of insufficient activity in practice. By addressing judges’
analysis concerning the efficiency of precautions in negligence
claims, this section illustrates court's oversight regarding the
existence of the risk. Additionally, it presents actual examples from a
related harm-prevention context where parties have strategically
restricted their activity levels in order to escape a duty of care.

A. The Risk of Insufficient Activity – An Illustration

Low activity levels can affect parties’ payoffs in two different ways.
First, low activity levels usually decrease parties’ benefits. Because
more train rides allow the railroad company to collect more money,
restricting the number of rides results in lost revenues. Second, low
activity levels also minimize the risk that parties who engage in the
activity will inflict harm on others. The fewer the number of rides,
the smaller the likelihood of setting the farmer’s crops on fire.
Maintaining a low level of activity may therefore enable parties to
avoid their duty to invest in precautions. Most importantly, in cases
in which the precautions cost more than the revenues forgone from
operating at a reduced level—a party can maximize her payoffs by
restricting her activity level. As the next example shows, however,
such behavior might result in social waste.43

Tabbach, supra note 41, at text accompanying notes 17, 24 (showing that with
fixed-cost precautions, a negligence rule cannot be optimally applied without
simultaneously determining the efficient activity and care levels; According to the
article’s model, the court sets the correct standard of care, but may not be able to
observe the injurer’s activity level, inducing the injurer to engage in socially
excessive activity levels); Avraham D. Tabbach, Causation and Incentives to
Choose Levels of Care and Activity under the Negligence Rule, 4 REV. L. & ECON.
133 (2008) (exploring the question of causation when the costs of precaution are
not the same per unit of activity); Steven Shavell, On Optimal Legal Change, Past
Behavior, And Grandfathering, 37 J. LEGAL STUD. 37 (2008) (proving that when
precaution is durable, it could be socially desirable to employ a grandfathering
policy under which parties who have already invested in precautions are exempt
from additional investment).

43 Our analysis involves examples in which parties decide whether or not to
invest in a single precaution (such as elevating the smokestack). As shown in the
Appendix, however, the problem of insufficient activity may also arise in situations
where there is a continuum of investment in care (investment of an additional
dollar in precaution further reduces the expected harm).
Hypothetical 2 – Negligence and the Risk of Insufficient Activity

Consider again the railroad-farmer hypothetical. Recall that the harm to the farmer’s crops in the case of fire is $200, and that the railroad company can set the number of rides at any number from zero to ten (where the benefit to the company from the first ride is $100, the second $90, and so forth). Assume now that speed does not affect the likelihood of fire—the company will therefore run its train at full speed (such that operation costs are only $1 per ride). Imagine, however, that the company can reduce the likelihood of fire from 30% to 10% per ride if it installs a spark arrester at a cost of $201. Note that the cost of the spark arrester differs from the cost of reducing the train’s speed—while the installation of a spark arrester is a fixed-cost investment that is not affected by the number of rides, the total cost of reducing the train’s speed increases at a constant rate with every additional ride.

From a social perspective, given these assumptions, it is desirable to install the spark arrester and then run the train 8 times. With the spark arrester installed, the expected harm from each ride is $20 (10% of $200). Since the operation cost per ride is $1, the overall social cost per ride equals $21 ($20 expected harm + $1 operation cost). This social cost is lower than the benefit from each of the rides up to the 8th ride (the benefit for the 8th ride is $30, while the benefit for the 9th ride is $20 and only $10 for the 10th ride). Because the spark arrester diminishes by 20% (from 30% to 10%) the risk that a train ride will cause a loss of $200, it saves $40 in expected harm per ride. With 8 rides, the spark arrester prevents harm of $320 (8 × $40), a benefit that outweighs its cost ($320 > $201). With the spark arrester installed, running the train 8 times yields the following results: on the benefit side, the train’s operation provides revenues in the amount of $520 (100 + 90 + 80 + 70 + 60 + 50 + 40 + 30 = $520). On the cost side, each of the rides involves a cost (expected harm + operation cost) of $21, for a total of $168 (8 × $21), and the installation of the spark arrester requires a single-time fixed investment of $201. Therefore, in the final tally, the net social benefit of running the train 8 times equals $151 ($520 – $168 – $201 =
The following table summarizes the overall costs and benefits for all activity levels (number of rides) assuming a spark arrester is installed. As it shows, social utility is maximized when the railroad runs the train 8 times.

### Hypothetical 2 – Costs, Benefits and Social Utility with Spark Arrester (fixed installation cost of $201)

<table>
<thead>
<tr>
<th>Rides</th>
<th>Overall Revenues</th>
<th>Overall Operation Costs</th>
<th>Railroad’s Overall Net Benefit</th>
<th>Overall Expected Harm</th>
<th>Overall Social Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ride</td>
<td>$100</td>
<td>$1 + $201</td>
<td>-$102</td>
<td>$20</td>
<td>-$122</td>
</tr>
<tr>
<td>2 Rides</td>
<td>$190</td>
<td>$2 + $201</td>
<td>-$13</td>
<td>$40</td>
<td>-$53</td>
</tr>
<tr>
<td>3 Rides</td>
<td>$270</td>
<td>$3 + $201</td>
<td>$66</td>
<td>$60</td>
<td>$6</td>
</tr>
<tr>
<td>4 Rides</td>
<td>$340</td>
<td>$4 + $201</td>
<td>$135</td>
<td>$80</td>
<td>$55</td>
</tr>
<tr>
<td>5 Rides</td>
<td>$400</td>
<td>$5 + $201</td>
<td>$194</td>
<td>$100</td>
<td>$94</td>
</tr>
<tr>
<td>6 Rides</td>
<td>$450</td>
<td>$6 + $201</td>
<td>$245</td>
<td>$120</td>
<td>$125</td>
</tr>
<tr>
<td>7 Rides</td>
<td>$490</td>
<td>$7 + $201</td>
<td>$282</td>
<td>$140</td>
<td>$142</td>
</tr>
<tr>
<td>8 Rides</td>
<td>$520</td>
<td>$8 + $201</td>
<td>$311</td>
<td>$160</td>
<td>$151</td>
</tr>
<tr>
<td>9 Rides</td>
<td>$540</td>
<td>$9 + $201</td>
<td>$330</td>
<td>$180</td>
<td>$150</td>
</tr>
<tr>
<td>10 Rides</td>
<td>$550</td>
<td>$10 + $201</td>
<td>$339</td>
<td>$200</td>
<td>$139</td>
</tr>
</tbody>
</table>

Although social utility is maximized if the company installs the spark arrester and runs the train 8 times, a negligence regime would induce the company to limit the train's activity to only 5 rides and avoid installing the spark arrester. To see why, let’s examine the company’s profits from 8 rides (high activity level) and 5 rides (low activity level).

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44 Similar analysis shows that the net social benefit would be smaller where the spark arrester is not installed. Recall that without the spark arrester the expected harm per ride is $60, since the likelihood of fire (a loss of $200) is 30%. Avoiding the installment of the spark arrester thus increases the social cost per ride to $61 ($60 expected harm + $1 operation cost). Because the revenues from the 5th ride are only $60, it would be desirable in this case to run only 4 rides. Given the operation of 4 rides without a spark arrester, the overall revenues would be $340 ($100 + $90 + $80 + $70) and the overall cost would be $244 (4 × $61), for a net benefit of only $96.
NEGLIGENCE AND INSUFFICIENT ACTIVITY

activity level). As this comparison shows, assuming that courts focus on the efficiency of precautions (and disregard activity levels) in determining negligent behavior, the company would earn higher profits if it sets its activity level at only 5 rides and refrains from installing the spark arrester.

As noted, if the company installs a spark arrester it reduces the expected harm by $40 per ride. Where the company runs the train 8 times, the social benefit from the spark arrester (8 × $40 = $320) is higher than its costs ($201). If the company runs the train 8 times—as social maximization mandates, it would therefore be required to make an investment of $201 to avoid liability. Such investment—while increasing social welfare—comes out of the company’s pockets and thus decreases its private net benefit. Specifically, if the company runs the train 8 times, it would collect revenues of $520 (100 + 90 + 80 + 70 + 60 + 50 + 40 + 30 = $520) but also incur, in addition to operation costs of $8 (8 × $1), a cost of $201 (the cost of the spark arrester). Its net profits would therefore amount to $311 ($520 − $8 − $201).

In contrast, if the company limits the train’s activity to only 5 rides, it would not be required to install the spark arrester. In this case, the social benefit from the spark arrester in the reduction of the expected harm ($40 × 5 = $200) is lower than its cost ($200 < $201). If the company runs the train only 5 times, it can thus save the need to install the spark arrester while still avoiding liability. With 5 rides, the revenues of the company are $400 (100 + 90 + 80 + 70 + 60) and operation costs are $5 (5 × $1). Because there are no precautions that could cost-effectively reduce the risk to the crops, the company does not bear any additional costs. The company’s net benefit with 5 rides thus equals $395 ($400 − $5), as compared to only $311 where the train runs 8 times and is equipped with a spark arrester. These results are summarized in the following table, which contrasts the railroad's profits and social utility for different activity levels. Recall that under negligence, the railroad is required to install the spark arrester (at a cost of $201) only if it runs the train more than 5 times.

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45 This would not be the case if the company operates more than 5 rides; for 6 rides, the spark arrester would reduce expected harm by $240 and thus become a cost-effective precaution.
Hypothetical 2: Costs, Benefits and Social Utility under Negligence

<table>
<thead>
<tr>
<th></th>
<th>Overall Revenues</th>
<th>Overall Operation Costs</th>
<th>Railroad's Overall Net Benefit</th>
<th>Overall Expected Harm</th>
<th>Overall Social Utility</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Ride</td>
<td>$100</td>
<td>$1</td>
<td>$99</td>
<td>$60</td>
<td>$39</td>
</tr>
<tr>
<td>2 Rides</td>
<td>$190</td>
<td>$2</td>
<td>$188</td>
<td>$120</td>
<td>$68</td>
</tr>
<tr>
<td>3 Rides</td>
<td>$270</td>
<td>$3</td>
<td>$267</td>
<td>$180</td>
<td>$87</td>
</tr>
<tr>
<td>4 Rides</td>
<td>$340</td>
<td>$4</td>
<td>$336</td>
<td>$240</td>
<td>$96</td>
</tr>
<tr>
<td>5 Rides</td>
<td>$400</td>
<td>$5</td>
<td>$395</td>
<td>$300</td>
<td>$95</td>
</tr>
<tr>
<td>6 Rides</td>
<td>$450</td>
<td>$6+$201</td>
<td>$243</td>
<td>$120</td>
<td>$123</td>
</tr>
<tr>
<td>7 Rides</td>
<td>$490</td>
<td>$7+$201</td>
<td>$282</td>
<td>$140</td>
<td>$142</td>
</tr>
<tr>
<td>8 Rides</td>
<td>$520</td>
<td>$8+$201</td>
<td>$311</td>
<td>$160</td>
<td>$151</td>
</tr>
<tr>
<td>9 Rides</td>
<td>$540</td>
<td>$9+$201</td>
<td>$330</td>
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<td>10 Rides</td>
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<td>$10+$201</td>
<td>$339</td>
<td>$200</td>
<td>$139</td>
</tr>
</tbody>
</table>

The company’s expected insufficient activity level (5 rides) and sub-optimal care (no spark arrester) results in social waste. As indicated, when it operates the train only 5 times, the company gains a profit of $395. Because the spark arrester is not installed, the expected harm from each ride is $60 (30% of $200); with 5 rides, the overall expected harm to the farmer’s crops is thus $300 (5 × $60). In total, therefore, the net social utility with 5 rides is only $95 ($395 – $300). Had the company installed the spark arrester and operated the train 8 times, as is socially optimal, social benefit would have been higher by $56 ($151 – $95).

The risk of insufficient activity and sub-optimal care is not limited to injurers. Similar analysis shows that victims may also adopt such a strategy. Assume, for example, that the farmer may decrease the likelihood of fire by maintaining a firebreak at a fixed cost (care) and by restricting the size of the field (activity). Note again that the cost of the firebreak differs from the cost of spraying a fire retardant chemical in Hypothetical 1 – while a firebreak is a fixed-cost investment, the total cost of spraying chemicals increases at a constant rate with every additional acre. Imagine that it is socially desirable that the farmer invest in the firebreak and set the size of the field at X acres. The farmer, however, may nevertheless find it in her best interest to set the size of the field below X. If the farmer is subject to a negligence-based standard (i.e., contributory negligence),
she will be liable for failures to invest in efficient precautions. Keeping the size of the field small enough (and hence reducing the possible loss) can render the firebreak inefficient. To the extent that the cost of the firebreak outweighs the possible profits from additional crops, restricting the size of the field below $X$ allows the farmer to maximize her payoff.

The preceding analysis, therefore, shows that parties can avoid investment in desirable precautions and thus increase their net private benefit by restricting the risk of harm. The possibility of such conduct can arise in cases in which the likelihood of harm depends either on the behavior of the injurer (railroad), the victim (farmer), or both; it can evolve whether precautions prevent harm entirely (as in the polluting plant hypothetical) or in part (as in the railroad-farmer hypothetical); and it can emerge under various liability regimes applying reasonable-behavior standards.46 The next section, elaborating on the results of Hypotheticals 1 and 2, describes in more detail the conditions under which parties are likely to pursue such behavior.

**B. The Prerequisites for Insufficient Activity**

When are negligence-based standards most likely to induce a party to restrict her activity level in a socially harmful way? In what cases

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46 This result of sub-optimal care (and insufficient activity) casts doubt on another widely shared convention in tort scholarship. Under the rule of negligence, a party who fails to meet the standard of care risks being liable for the harm that results from her behavior. Because even a small departure below the standard is sufficient to render the behavior negligent, scholars have claimed that parties who face some uncertainty as to whether they comply with the standard of care will often prefer to err on the side of over, rather than the under, investments in precaution. See, e.g., Jason Johnston, *Punitive Liability: A New Paradigm of Efficiency in Tort Law*, 87 COLUM. L. REV. 1385, 1392-1401 (1987) (discussing parties’ incentives to take extra precautions in the face of uncertainty regarding the standard of care). Yet, as the analysis of this Article shows, another strategy to avoid liability is reducing one’s level of activity. Thus, negligence might induce parties who are uncertain about the standard of care to reduce their activity level and under-invest (rather than over-invest) in precautions. See also, John E. Calfee & Richard Craswell, *Some Effects of Uncertainty on Compliance with Legal Sanctions*, 70 VA. L. REV. 965 (1984) (exploring the effects of uncertainty on parties’ incentives to invest in precautions but overlooking the risk of insufficient activity).
would a party prefer a low activity level and no precautions while social welfare maximization dictates that precautions be taken and activity set at a higher level? As shown below, this result would require two conditions. First, the precaution must be of the sort that is not cost-justified at the low activity level but is cost-justified at the high activity level. That is, the cost of care must exceed the harm prevented by such care at low activity levels, while being smaller than the harm such care prevents at high activity levels. An important (though not the only) case that can often satisfy the first condition is where the cost of care is fixed such that it is unaffected by the party’s level of activity. A second condition is that the cost of precaution in the high activity level must be intermediate—it must be neither too “low” nor too “high” but rather lie within a certain range: on the low end, it must exceed the private benefit that the party may derive from increasing her level of activity; on the high end, it must be less than the social gain from the additional activity and the diminished risk of harm.

Consider the first condition that the precaution is not cost-effective in the low activity level but becomes cost-justified in the high activity level. The result of this condition is that the party faces no duty of care at the low level but is required to invest in precautions at the high level. To illustrate, recall that the cost of installing a spark arrester in Hypothetical 2 was unaffected by the number of train rides. By contrast, because each ride augmented the risk of setting the crops on fire, the social benefit from installing the spark arrester increased with every additional ride. This was the driving force behind the railroad’s decision to restrict its activity to 5 rides, below the socially desirable level. The operation of only 5 rides resulted in a lower magnitude of harm that made the investment in the spark arrester inefficient. Keeping the number of rides small enough, the company was able to save the cost of precaution. In such cases, as demonstrated above, the overlooked suboptimal care and insufficient activity paradigm may evolve. As the party enhances its activity level, the expected harm prevented by taking care may reach a point where investing in the precaution becomes warranted. This party may thus prefer sacrificing the extra benefit of further raising its activity level in order to save the costs of taking care.

As noted above, the literature’s standard prediction of optimal care and excessive conduct is driven by the (often implicit) assumption
that the cost of care is the same per unit of activity.\textsuperscript{47} Recall that in Hypothetical 1—illustrating the conventional account—the railroad’s precaution did not involve a single-time investment (as in the case of the spark arrester in Hypothetical 2). Rather, the railroad was able to efficiently diminish the expected harm by limiting speed at a cost of $1 per ride. Accordingly, in Hypothetical 1, restricting the actual number of rides could not relieve the railroad of its duty to invest in precautions. Regardless of the total number of rides, a failure to reduce the speed of any particular ride would require the railroad to pay for the harm this train-ride caused the farmer’s crops. In this case, where the cost of care is the same per unit, only excessive, rather than insufficient, activity is possible. As shown, the railroad will always reduce speed to avoid liability, but then disregard any remaining undesirable risks. It will increase its level of activity (the number of rides) even when its private benefit from such an increase is lower than the harm it inflicts on the farmer.\textsuperscript{48} Put differently,

\textsuperscript{47} See, e.g., Cooter & Ulen, supra note 17, at 332 (demonstrating the risk of excessive activity levels using the example of drivers who may take optimal care and then drive too many miles, and implicitly assuming that the cost of driving carefully is the same per each mile); See similarly Robert D. Cooter & Ariel Porat, Liability Externalities and Mandatory Choices: Should Doctors Pay Less?, 1 J. Tort L. 1, 4 (explaining the risk of excessive activity levels in the context of car accidents while implicitly assuming that the cost of care is increasing with activity at a constant rate). This assumption is sometimes explicit. See, e.g., A. Mitchell Polinsky & William P. Rogerson, Products Liability, Consumer Misperceptions, and Market Power, 14 Bell J. Econ. 581, 582 (1983) (discussing parties’ incentives to excessively engage in activities where the costs of precautions are the same for each “unit” of activity); Landes & Posner, supra note 5 at, 61, 66, 69 (assuming costs of care are the same per “unit” of activity).

\textsuperscript{48} Precautions requiring a fixed-cost investment, as noted, usually satisfy the first condition, but certainly are not the only precaution that may give rise to the risk of insufficient activity. Even if the overall cost of care increases with more activity, parties may deliberately restrict their activity level. To illustrate, consider again the polluting factory hypothetical. Imagine that the cost of elevating the smokestack is $120 in the low level (as it is in the original example) but increases to $125 in the high activity level. It is still desirable in this case to have more activity and investment in precaution than low activity and no precaution ($1100 – $125 > $1000 – $110). Yet from the factory’s perspective it is better to operate in the low level (and gain $1000) rather than in the high level (where the benefit increases by $100 but requires investment of $125 in care). More generally, the first condition could be satisfied as long as the costs of care do not increase at the same rate as the level of activity.
when the costs of care are the same per unit of activity, the first condition cannot be satisfied: such precautions cannot be unjustified for low activity but become cost-effective for high activity.

Consider now the second condition of *intermediate costs*. Insufficient activity may occur only when the cost of the precaution in the high activity level is neither “too high” nor “too low.” Suppose first that this cost is “too low” – in the sense that the cost of taking care is lower than the party’s extra benefit from engaging in the high activity level. In this case, it is in the party’s own interest to set her activity at the high level and invest in the efficient precaution. To illustrate, consider again Hypothetical 2. Suppose that the cost of installing the spark arrester is only $1. This cost is obviously lower than the benefit to the railroad of running 10 (rather than 5) rides. Operating rides 6 through 10 increases the railroad’s net benefit by $145 ($50 + $40 + $30 + $20 + $10 − $5 = $145, the revenues from these rides, minus the cost of $1 to operate each). The railroad company would therefore install the spark arrester and run 10 rides, rather than taking no precautions and operating just 5 rides. Here, where the cost of precaution is sufficiently low, the conventional literature’s paradigm of *optimal care and excessive activity* reemerges. The company takes due care (it installs the spark arrester, which costs only $1) but engages in a socially excessive activity level. Although it is socially desirable to operate only 8 rides, the company will run all 10 rides.49

Now consider the situation where the cost of taking care in the high activity level is “too high” – in the sense that it is higher than the total social benefit from more activity and care. In such a case, the precaution is too expensive to render activity at the high level socially desirable. To illustrate, assume that the cost of the spark arrester in Hypothetical 2 is not $201 but rather $500. Assume further that the spark arrester can reduce the probability of fire to zero. For ease of exposition, suppose the railroad can run either 5 rides (low activity level) or 10 rides (high activity level). At the high activity level, with 10 rides, the expected harm is $600 (10 × $60). With 10 rides, therefore, the spark arrester becomes cost-effective

49 Recall that once the spark arrester is installed, the social cost per ride is $21 ($20 expected harm + $1 operation cost). Because the revenue from the 9th and 10th rides ($20 and $10, respectively) is below $21, the operation of these rides diminishes social welfare.
Nevertheless, investment in the spark arrester and the operation of 10 rides would not maximize social utility. While the spark arrester is cost-effective at the high activity level, its cost ($500) outweighs the social benefit derived from additional activity and reduced harm. Recall that with 5 rides and absent a spark arrester, the expected harm is $300 (5 × $60). Installing the spark arrester thus saves $300 in the prevention of damage to crops. Recall also that the railroad’s benefit from running 10 rather than 5 rides is $145 (50 + 40 + 30 + 20 + 10 – 5, the railroad’s revenue from these five rides minus their operation costs). Thus, the total social benefit from installing the spark arrester and running the train 10 rather than 5 times is $445 ($300 + $145), which is smaller than the cost of installing the spark arrester ($445 < $500). As this example demonstrates, when the cost of the precaution is too high, the risk of insufficient activity and sub-optimal care does not exist. Setting the activity at the low level (5 rides) and avoiding investment in prevention (spark arrester) are socially desirable.

Determining whether the circumstances of a given case give rise to the risk of insufficient activity might appear somewhat complicated. Yet, according to an interesting corollary of the second condition, it is possible to provide a simple and useful rule of thumb that facilitates the identification of cases with the risk of such behavior. According to this rule of thumb, in all insufficient activity cases, it must be that the harm caused by operating at the high level of activity (with the precaution) is smaller than the harm caused in the lower activity level (without the precaution). Recall that according to the second condition, the cost of the precaution at the high activity level must not be “too low”. As explained, this cost must not be lower than the party’s extra benefit from increasing her activity level. This means that from the private perspective of the party, increasing the level of activity and investing in the precaution is undesirable. For increased activity and care-taking to be nevertheless socially desirable, it must be that the harm caused by the high activity level (with the precaution) is smaller than the harm caused by the low activity level (without the precaution). Only when this condition is fulfilled will the party’s low activity level be socially inefficient.

50 To illustrate, consider the result in Hypothetical 2, in which the optimal level of activity was operating 8 rides while installing the spark arrester. In this case, the expected harm was $20 per ride (10% × $200). Thus, at the higher level of activity
C. The Risk of Insufficient Activity in Practice

This section expands upon the actual risk of insufficient activity that exists under negligence-based regimes. It demonstrates how courts ignore the risk of insufficient activity when applying the Hand formula, and provides evidence from a related harm-prevention context to illustrate how parties limit their activity to escape a duty of care.

1. Cost-Benefit Analysis in Negligence Cases

Although courts often apply economic reasoning to determine liability, they have nevertheless overlooked parties’ possible

of 8 rides, the total expected harm equaled $160 (8 × $20). Under the railroad company’s actual lower activity level, however, expected harm was larger: the company operated only 5 rides without installing the spark arrester. Here, the expected harm per ride was $60 (30% of $200). With 5 rides, then, total expected harm equaled $300 (5 × $60), as compared to only $160 at the higher level of activity. Similarly, in the polluting factory hypothetical, the discrepancy in the size of the harm was even more pronounced. In the high activity level with the precaution taken (a higher smokestack) there was no harm. In the low activity level, however, when the factory avoided elevating its smokestack, harm equaled $110.

To see more formally how this conclusion is derived, denote the extra benefit the party makes when preferring the high rather than the low level of activity as \( U \), the cost of the precaution required at the high activity level as \( F \), the harm in the low activity level without the precaution as \( H(low) \) and the harm in the high activity level with the precaution as \( H(high) \). In order for the party to prefer engaging in the low activity level without taking care to engaging in the high activity level and taking care, it must be that \( U < F \) (the party’s extra benefit from engaging in the high activity level is smaller than the cost of taking care). This corresponds to the first prong of the second condition, that the cost of taking care not be “too low.” On the other hand, in order for such behavior to be socially inferior it must be that social welfare in the high activity level (with the precaution) is higher than social welfare in the low activity level (without the precaution), that is: \( U - H(high) - F > -H(low) \). This corresponds to the second prong of the second condition, namely, that the cost of taking care not be “too high.” Combining these two conditions and rearranging terms gives: \( U < F < U + H(low) - H(high) \). If this condition is satisfied, it must be the case that its right hand side is larger than its left hand side. This, in turn, implies that \( H(low) - H(high) > 0 \), that is, the harm in the low level of activity (without the precaution) is larger than the harm in the high level of activity (with the precaution).
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incentives to restrict their activity below the socially desirable level. This disregard is particularly evident in contexts where the costs of precaution are fixed. As the above analysis has shown, because fixed-cost precautions are often inefficient at low activity levels but cost-effective at high activity levels, a likely scenario where the problem of insufficient activity levels may develop is when the costs of care include a fixed-cost investment. The following cases, all of which involve fixed-cost precautions, demonstrate courts’ lack of appreciation of the risk of insufficient activity.

In Donovan v. Castle & Cooke Foods, the defendant—a producer of cans—was sued for failing to properly protect its employees from exposure to harmful noise levels. Specifically, the defendant merely provided its employees with ear plugs, while the plaintiff claimed that noise insulation of the factory’s equipment would have been more effective in protecting the workers. After conducting a thorough cost-benefit analysis, the Court of Appeals for the 9th Circuit ruled in favor of the defendant. It concluded that given the large investment required for noise insulation as compared to the benefit it could provide to the factory’s existing workforce, such investment was not cost-justified.

In Spagnulo v. Commonwealth of Massachusetts Department of Environmental Management the plaintiff had been injured when falling off a set of bleachers located at a hockey rink owned by the defendants. The plaintiff claimed that defendants were reckless in failing to install safety railings around the bleachers. Applying the Hand formula, the Court compared the costs and benefits of such precaution and accepted defendants’ motion for summary judgment. As the court explained, the expected harm did not justify investment in the railings.

The plaintiff in Manning v. Nobile—a driver who consumed a substantial amount of alcohol at a party in a Marriott hotel—was

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52 692 F.2d 641 (9th Cir. 1982). The regulations in question had been promulgated pursuant to the Occupational Safety and Health Act, 29 U.S.C. §§ 651-678. Id. at 643.
53 Id. at 649-50.
54 Id. at 650.
56 Id. at 1.
57 Id. at 12.
injured after his car struck a tree. The plaintiff claimed that Marriott was reckless in failing to assign a bartender to the party. The court dismissed this claim, holding that the party did not involve a ‘... high degree of probability ... [of] substantial harm’ required to prove willful, wanton, or reckless conduct. Although a bartender would have probably prevented the excessive consumption of alcohol, the court was not convinced that assigning a bartender to the party was cost-justified.

In these decisions, the court assessed the reasonableness of the injurer’s behavior according to a cost-benefit analysis that ignores the risk of insufficient activity. The court examined whether the injurer’s omitted fixed-cost precaution was efficient in light of the expected harm resulting from the party’s actual level of activity. It failed to consider, however, whether an increase in the injurer’s activity level coupled with care taking would have been socially superior. By focusing only on the existing activity level, courts may allow parties to avoid desirable precaution by restricting the intensity of their conduct. For example, the hotel in the Manning case might have limited the size of parties taking place on its premises so as to avoid the increased chances of an accident and therefore the attendant need to hire bartenders. Yet larger parties with bartenders may well be more socially desirable (involving a lower risk of harm) than small parties in which alcohol is consumed without control. Similarly, in both the Donovan and Spangulo cases, social welfare maximization might have required the injurer to increase its activity as well as its care level. In Donovan, insulating the factory’s equipment could have become efficient had the number of the factory’s employees been larger. Likewise, the efficiency of railings in Spungalo was dependent on the number of spectators. Determining liability in these cases on the basis of the defendants’ actual activity could thus encourage inefficient behavior. Factories may limit their workforce to avoid precaution, even when a larger workforce accompanied by more extensive care is socially desirable. In the same vein, the owners of hockey rinks may undesirably restrict the number of spectators (by limiting the size of the rink and the

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59 Id. at 389.
60 Id.
61 Id.
number of shows)—to escape the duty to invest in efficient safety measures.

2. Regulatory Thresholds and Strategic Activity Levels

Are parties—subject to a negligence standard—likely to strategically limit their activity levels? While tort scholarship has generally disregarded this possibility, evidence of parties’ behavior in a related harm-prevention context suggests that this risk is real. Studies have shown that parties faced with threshold-based regulation often limit their activity to the threshold in order to avoid making investments in precaution. As these studies demonstrate, parties strategically adjust their activity levels to reduce the costs of care.

Safety and environmental regulations often condition the imposition of duties to invest in precaution on whether parties’ activity exceeds a certain threshold.62 Consider, for example, regulation that requires installation of sprinklers if the number of seats in a classroom is greater than ten. As opposed to tort liability, which depends on courts’ ex-post evaluation of whether parties’ conduct was reasonable, regulatory thresholds allow policymakers to provide clear requirements concerning investments in care. By setting this ten-seat minimum, the regulator determines the circumstances that make investments in sprinklers socially desirable.63 Most importantly, such regulation is not intended to induce parties to set their activity at any particular level. In our example, the regulation is not designed to induce schools to favor small classrooms (less than 10 seats) over large classrooms (more than 10 seats) but rather it serves as a guideline as to whether or not sprinklers should be installed.

Empirical studies, however, have shown that the existence of such thresholds nevertheless affects parties’ choices regarding their activity levels. Because investments in care are costly and can outweigh the profits from greater activity, self-interested parties have

62 See, for example, John Watts., Reconciling Environmental Protection with the Need for Certainty: Significance Thresholds for CEQA, 22 ECOLOGY L.Q. 213, 245 (1995).
63 Id., at 254-58 (discussing the advantage of threshold-based regulation in providing clear guidance and reducing the costs of compliance)
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responded to such regulation by limiting their activity to a level below the threshold. For example, a recent report regarding the use of hazardous materials in Massachusetts concluded “that firms appear to be strategically reducing toxic chemical use below threshold amounts rather than reducing releases overall.” 64 As this study suggests, firms have limited their activity levels in order to avoid application of the relevant regulation. Researchers have documented such behavior in other areas as well. For example, studies covering several U.S. states have shown that safety and environmental regulation of construction projects involving acreage-based thresholds has induced similar strategic conduct and “projects are frequently designed so as to just barely avoid the threshold.” 65 At first blush, a negligence-based standard appears to overcome the risk of such strategic conduct as it does not involve any fixed thresholds. The Hand formula weighs the costs and benefits of the contested conduct without presupposing a certain minimum activity level above which precaution becomes desirable. However, as the preceding analysis has demonstrated, the risk of strategic reduction of activity levels also exists when the applicable rule is negligence. The evidence regarding parties’ deliberate curtailment of activity levels in the context of regulatory thresholds demonstrates how parties are likely to apply a similar strategy when subject to negligence. By reducing their activity level, parties can avoid socially desirable investments in care. The risk of parties intentionally setting their activity level just below the prescribed limit has led policymakers to question the desirability of fixed threshold regulation. 66 The next Part shows that in the context of negligence, the legal system can successfully reduce the risk of such strategic conduct.

64 Michael P. Vandenbergh, The Private Life of Public Law, 105 COLUM. L. REV. 2029, 2061, at n. 141 (2005); See also, Richard B. Stewart, Environmental Regulation and International Competitiveness, 102 YALE L.J. 2039 (1993) at n. 103 (citing a corporate executive’s statement that “given air pollution control and other environmental requirements and liabilities a steel galvanizing line at a steel plant was reconfigured solely in order to bring emissions just below the level that would trigger new source review under the Clean Air Act.”).

65 See Watts, supra note 62, at 245.

66 Id (describing the risk of strategic behavior and states’ attempts to eliminate it).
III. INDUCING OPTIMAL PREVENTION AND MINIMIZING THE LOSS FROM INSUFFICIENT ACTIVITY LEVELS

This Part discusses three strategies that courts, regulators and legislatures can apply in addressing this risk. The following discussion shows that extension of the accepted basis of liability for negligent behavior, the implementation of certain forms of regulation, and the proper selection of liability regimes can effectively remove parties’ incentives to restrict their engagement in desirable activities.

A. Applying the Negligence Standard to Insufficient Activity

Tort law may discourage parties from undeniably restricting their activity levels by imposing liability for insufficient activity. Section 1 makes the case for the introduction of such liability. It demonstrates that in cases where courts possess sufficient information regarding precautions’ efficiency they can deter parties from strategically limiting their activity. Section 2 addresses possible objections.

1. Liability for Insufficient Activity

Under the current application of the Hand formula, parties are only liable for failures to invest in cost-justified precautions. This practice, however, allows self-interested parties to avoid efficient investments in prevention by restricting their activity. To discourage such behavior, negligence liability should be extended to failures to invest in precautions whose cost is higher than their benefit in reducing the expected harm. More specifically, such liability is required when the previously discussed conditions are met, namely that parties’ untaken precautions are inefficient at low activity levels but become cost-justified and socially optimal at higher levels. Making parties liable in such cases would eliminate the benefits they may derive from engaging insufficiently in the activity. Once liable
for the harm, parties’ payoff under the low activity level would be smaller than their payoff under the high activity level. For example, consider again the polluting factory hypothetical. Recall that in the low activity level, the factory’s profit and neighbors’ harm equal $1000 and $110, respectively, compared to a profit of $1100 and $130 harm in the high activity level. Finding the factory negligent for failing to elevate the smokestack at a cost of $120—irrespective of the factory’s actual activity level—will remove its incentives to undesirably restrict production. Under this new form of negligence, operating at the low activity level without elevating the smokestack will provide the factory a net benefit of $890 ($1000 – $110), since it would be liable for the harm of $110. In contrast, producing at the high level with optimal precaution (a higher smokestack) allows the factory a net benefit of $980. The factory would thus be induced to adopt efficient levels of both care and activity.

Determining liability for insufficient activity mandates that courts investigate whether higher activity levels are socially desirable. As already noted, the costs required for obtaining the information necessary for such an inquiry might be prohibitive. Nevertheless, in some areas courts appear to be able to make such decisions at a reasonable cost. As scholars have shown, despite the “distinction between activity levels and due care,” there are “cases in which courts do take the costs and benefits of the activity into consideration.”67 For example, in negligence and nuisance disputes involving claims for unreasonable interference with the use and enjoyment of land, judges often examine not only parties’ investments in care but also whether changes in their activity levels could cost-effectively reduce the expected harm.68 Such cases

67 Latin, supra note 1, at 505. See also, Stephen G. Gilles, Rule-Based Negligence and the Regulation of Activity Levels, 21 J. LEGAL STUD. 319, 334 (1992) (arguing that parties’ activity level is clearly above the norm, in many cases “courts would apply the negligence standard.”).

68 See, e.g., LANDES & POSNER, supra note 3, at 70-71 (noting that in certain areas “[a]ctivity level is considered in negligence cases” and that “[t]he nuisance standard illustrates the common law’s awareness that when the . . . amount of activity is an important factor in bringing about the right level of damage, it should be part of the legal standard.”); Gilles, supra note 67 at 334 (“Certainly this is true in nuisance law, where courts frequently consider whether a defendant should be ordered to reduce the scale or frequency of his or her activities to abate the nuisance.”).
indicate that, at least with certain types of behavior, courts may determine the efficiency of parties’ activity levels. Consider, for illustration, the recent decision in *Esposito v. New Britain Baseball Club*. In this case, the plaintiffs resided near a baseball field in which fireworks displays were conducted each Friday night throughout the spring and summer. The residents suffered from the noise, smell and smoke of the fireworks. The court acknowledged that the organizers of the fireworks had taken all of the possible cost effective precautions. Nevertheless, the court continued to examine the reasonableness of the defendants’ level of activity. As the court put it, “[t]he one feasible precaution to avoid unnecessary interference that the defendants have not embraced is a reduction of shows.” In deciding on the reasonable number of shows, the court conducted a cost-benefit analysis of the defendant’s level of activity:

Balancing the interests involved under the circumstances of the present case, the court concludes that the severity of the interference, as it currently exists, outweighs the benefits of the interfering use which is, fundamentally, a profitmaking enterprise that provides entertainment. While the court recognizes and applauds the social utility of that business to the city, it is not sufficient to justify the extent to which these individual plaintiffs have suffered and will suffer the loss of the use and enjoyment of their property during the baseball season if the fireworks proceed as planned.

Accordingly, as the court ordered “… assuming that … the other precautions … remain in effect, the defendants are hereby ordered to

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70 Id. at 300-01.
71 Id.
72 Id.
73 Id. at 302.
reduce the number of shows during the season to one time each month [rather than once a week]...”\textsuperscript{74}

The Esposito case and similar decisions thus demonstrate how courts are sometimes capable of identifying the costs and benefits of parties’ different activity levels.\textsuperscript{75} In this respect, the conventional assumption that courts tend to disregard activity levels when evaluating reasonable behavior has important exceptions. Yet, cases in which courts currently explore the efficiency of activity levels focus only on the risk of excessive activity. As in the Esposito case, courts usually compare the defendant’s expected costs in reducing the intensity of his activity with the plaintiff’s benefits from such reduction. Courts’ decisions in favor of victims reflect a determination that the injurers’ actual level of activity is beyond the socially desirable level.

Courts’ rulings regarding excessive activity levels suggest they could also identify harms that result from insufficient activity levels. Such identification requires courts to apply the same type of analysis they have long been applying in Esposito-like cases, only in the opposite direction. In those contexts where evaluation of activity levels is feasible, courts should inquire not only if less activity is desirable but also whether more activity (along with additional precaution) could cost-effectively mitigate the alleged harm. The preceding discussion concerning the conditions under which the risk of insufficient activity levels may emerge indicates where this inquiry is most relevant. Courts should especially look for insufficient activity levels when parties’ untaken precautions are inefficient for low activity but become cost-effective for high activity. Within such cases, courts should follow the above mentioned rule of thumb and focus on

\textsuperscript{74} Id. at 303. The court also awarded the plaintiffs damages of $100 per resident. Id., at 304.

\textsuperscript{75} See, e.g., Pestey v. Cushman, 788 A.2d 496 (Conn. 2002) (“Whether the interference is unreasonable depends upon a balancing of the interests involved under the circumstances of each individual case. ... including the nature of both the interfering use and the use and enjoyment invaded, the nature, extent and duration of the interference ...”) (emphasis added); John L. Giesser, The National Park Service and External Development: Addressing Park Boundary-Area Threats through Public Nuisance, 20 B. C. ENVTL. AFF. L. REV. 761, 781 (1993) (“Another important component of unreasonableness is a defendant’s failure to mitigate harm. Courts might expect defendants to reduce the possibility of injury by ... reducing their activity’s level of interference.”).
instances in which higher activity and care would reduce expected harm.

In fact, cases involving liability for insufficient activity are in some important respects easier to litigate than excessive activity cases. A victim seeking a remedy for negligent behavior must prove not only that the injurer’s behavior was socially undesirable but also the existence of cause-in-fact. In the context of excessive activity levels, showing factual causation between the injurer’s negligent behavior and the harm is often complicated. Thus parties who suffer harm from injurers’ excessive conduct avoid filing claims even where courts could determine the inefficiency of injurers’ level of activity. In contrast, in claims of insufficient activity the demonstration of causation would usually be easier. Accordingly, claims based on the suggested new doctrine would generally be more likely to succeed in court.

To illustrate the complexity of the causation requirement in excessive-activity claims, imagine a pedestrian that is hit by a train. Assume that the train was operated with due care and that the pedestrian seeks compensation, claiming that the railroad’s activity level (the number of trains) is excessive. As scholars have explained, even if the court “could be convinced that the railroad was running too many trains, the plaintiff would gain nothing unless he or she could also show that the train that did the damage was of those that should have been eliminated, rather than one of those that should have been retained. That will be difficult (sometimes impossible) to do.”

The difficulties in identifying the exact harms that result from the excessive part of the behavior (rather than from the legitimate part of the behavior) thus usually make lawsuits for excessive activity levels especially costly. Determining causation in the case of insufficient-activity claims would often involve no such complication. Like in conventional tort lawsuits, such claims require investigating whether investment in

76 Gilles, supra note 67, at 334.
77 Mark Geistfeld, Should Enterprise Liability Replace the Rule of Strict Liability for Abnormally Dangerous Activities? 45 UCLA L. REV. 611, 634 n.82 (1998) (“even if the plaintiff could prove that the ... delivery trucks were driven for too many miles, the cause-in-fact problem would be insurmountable, as the plaintiff could not show that the injury would have been avoided had the truck driven less miles over the course of a year.”).
untaken precautions by the alleged negligent party (the party whose activity level is claimed to be too low) would have likely prevented the harm. In this respect, the activity level of the alleged negligent party is important only to determine whether his behavior is unreasonable. Once this element is proven, however, it has no bearing on the question of cause-in-fact. Consider, for example, the polluting factory hypothetical. Proving the factory’s negligence requires exploring the costs and benefits of different activity levels and the efficiency of raising the smokestack. Yet, once the neighbors show that higher production by the factory and investment in elevating the smokestack are socially desirable, the question of causation is straightforward. It requires deciding whether or not the harm (pollution) would have not occurred if precaution (a higher smokestack) were taken. Because no pollution would have occurred with the elevated smokestack in place, the cause-in-fact requirement is clearly satisfied.78

2. Objections: Liability for Nonfeasance and Parties’ Autonomy

Finding parties negligent for failing to increase their activity levels might nevertheless appear objectionable for two related reasons. First, from a doctrinal perspective, one may argue that parties’ decision not to further engage in their activity constitutes nonfeasance (inaction), and as a general rule, liability is primarily

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78 To be sure, in cases where optimal investment in precaution does not entirely remove the risk of harm, proving causation may present some difficulty in either excessive or insufficient activity claims (and in fact in any tort claim where optimal precaution does not reduce the risk of harm to zero). In such cases, the victim cannot conclusively show that her injury would have not occurred had the injurer invested in efficient precaution given that some harm materializes even under optimal care taking. In the farmer-railroad context, for example, recall that even with the spark arrester installed, a 10% risk of fire still exists. Consequently, when fire occurs absent a spark arrester, it may be difficult for the farmer to show that fire would not have occurred to his particular field if a spark arrester were in place. Yet, while this causation problem plagues excessive activity claims, it does not arise in insufficient-activity claims in which additional activity and care would have eliminated the risk of harm (as in the polluting plant hypothetical).
reserved for *misfeasance* (action). Second, as a matter of principle, requiring parties to increase their activity would undermine their autonomy. According to this claim, parties should be free in determining the degree to which they wish to engage in their conduct.

Regarding the first argument, classifying a failure to set an activity at the socially desirable level as *nonfeasance* is conceptually wrong. As courts and scholars have emphasized, the benchmark regarding the nonfeasance-misfeasance distinction is “defendant’s participation [or lack thereof] in the *creation of the risk*.” If the risk of harm was formed without the injurer’s participation, a failure on the part of the injurer to neutralize this risk constitutes *nonfeasance*; in contrast, if the injurer took part in the creation of the risk, his behavior constitutes *misfeasance*. This distinction highlights the difference between a defendant who failed to extend help to a drowning swimmer (defendant is not liable), and a defendant who drove at a reasonable speed but neglected to apply the car’s brakes (defendant is liable). While in both cases the injurer failed to take a positive measure (assisting the swimmer/pressing down on the brakes), only the former is considered a negligent *inaction*. In the car accident case, since the injurer was involved in the creation of the risk (driving the car), his neglect to prevent the harm constitutes a

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80 Ernest J. Weinrib, *The Case for a Duty to Rescue*, 90 Yale L.J. 247, 255 (1980). See similarly, Restatement (Third) of Torts: Liability for Physical Harm (Proposed Final Draft, 2008) § 37 cmt. a. (explaining that the difference between nonfeasance and misfeasance is the distinction between “active risk creation and passive failure to act in the face of danger that was not the doing of the actor”). For a line of cases applying this benchmark, see, § 37, Reporters’ Note, cmt. a.

81 See e.g., Weinrib, supra note 80 at 253 (addressing the differences between the failure to rescue a drowning swimmer and the failure to apply one’s brakes); Harold F. McNiece & John V. Thornton, *Affirmative Duties in Tort*, 58 Yale L.J. 1272, 1272-73 (1949) (discussing the case of a driver’s neglect to apply the brakes in his car and other cases that may appear as inaction rather than action).
Applying this analysis to our polluting factory example (as well as to the railroad-farmer hypothetical), the defendant directly participated in the formation of the risk as it is the plant’s production process that exposed its neighbors to pollution. Therefore, from a doctrinal perspective, the plant’s failure to eliminate the harm constitutes misfeasance rather than nonfeasance.

As for the second claim, a duty mandating adjustment of one’s activity level is not qualitatively different than a duty mandating greater precautions. Both duties restrict defendants’ autonomy and require them to make investments aimed at reducing the expected loss when harm prevention is desirable. Furthermore, the imposition of liability for insufficient activity does not compel injurers to perform their activity at a certain level. Injurers are still free to engage in their activity to the extent that they wish; rather, this form of liability only makes injurers bear the true costs of their conduct.

The standard of reasonable behavior (the Hand formula) allows injurers to inflict harm on victims without compensation as long as their activity provides greater social benefits than social costs. When parties limit their activity to avoid a duty to invest in cost-justified precautions, it is precisely the idea of negligence (enhancement of social welfare) that calls for the imposition of liability.

By extending the conventional basis of negligence, tort law may thus decrease the risk of sub-optimal care and insufficient activity levels. Given the absence of the cause-in-fact obstacle, and by focusing on cases involving the conditions under which the risk is most likely, courts may discourage parties from reducing their activity level in order to avoid investments in efficient precautions. Still, because of the limited information they may have, courts are likely to provide only a partial solution. As the next section shows, regulation of

82 Weinrib, supra note 80 at 253 (failure of a driver to apply his car’s brakes is a negligent action); McNiece & Thornton, supra note 81 at 1272-73 (same).

83 See supra, note 12 (presenting the Hand formula and its focus on social welfare maximization).

84 “[t]he balancing approach [endorsed by the negligence standard] rests on and expresses a simple idea. Conduct is negligent if its disadvantages outweigh its advantages, while conduct is not negligent if its advantages outweigh its disadvantages.” Restatement (Third) of Torts: Liability for Physical Harm (Proposed Final Draft, 2008) § 4. cmt. e.
parties’ behavior can supplement the tort system and provide incentives for optimal prevention.

**B. Regulations and Efficient Activity Levels**

Regulation often imposes substantial constraints on the extent to which parties may engage in their behavior. Such regulation-based constraints may involve several forms, many of which result in placing a cap on parties’ level of activity. For example, in the context of potential nuisance activities, regulation often controls the expected harm by imposing limits that restrict the duration and frequency of such activities. Regulations addressing the extent to which parties may engage in harm-inflicting activities are commonly set in addition to tort liability. As noted, legal scholarship has argued that this combination of liability and regulation creates an effective division of labor. Courts, through the rules of tort law, impose...
liability for failures to invest in cost-effective precaution. Legislatures, by setting regulations that restrict the extent to which parties could engage in their conduct, induce efficient levels of activity.

This division of labor, however, is likely to result in efficient harm-prevention only if one focuses on the conventional concern regarding excessive activity levels. It assumes that negligence regimes create incentives for optimal precautions and that regulation assures that, once such precautions are taken, parties will not over-engage in their activities. Yet, as the preceding analysis has shown, parties subject to negligence standards may strategically limit their activity and avoid efficient investments in care. In such cases, the combination of reasonable-behavior standards and maximum-activity regulation cannot induce efficient prevention. More specifically, the overlooked paradigm of insufficient activity sheds new light both on the proper use of regulation and on its desirable format.

Consider initially the question of when regulation is required. Tort scholarship’s conventional theory for the use of regulation in the context of activity levels has highlighted the risk that parties may set their activity beyond the socially desirable level. Most importantly, it has assumed that where excessive activity levels are unlikely, the tort system in and of itself is sufficient to induce parties to efficiently minimize the expected harm. Yet, as shown above, this assumption is false. Even in contexts where the risk of excessive activity does not exist, tort liability may encourage parties to adopt insufficient activity levels. This overlooked risk therefore provides a new justification for the application of regulation in cases in which it has been so far perceived as unnecessary. Subjecting parties to regulation


89 See supra text accompanying note 36.
might be required to discourage not only excessive but also insufficient activity.
The risk of insufficient activity similarly bears on the proper design of regulations addressing activity levels. As noted, such regulations often impose restrictions aimed at limiting parties’ activity. Maximum-activity regulations, however, are effective only if parties’ possible incentives are to over-engage in their activity. By contrast, such regulations cannot resolve the opposite incentives that parties may have to restrict their activity and avoid desirable precaution. To discourage insufficient activity, rather than limiting parties’ activity levels, regulation can require compliance with pre-specified safety standards. The preceding discussion implies that this type of regulation could induce not only optimal care taking but also efficient levels of activity. For example, in the context of pollution, maximum activity regulation will avoid over-production but not under-production. As the polluting-plant hypothetical demonstrates, its possible inefficient behavior may involve not too much, but rather too little activity. Maximum-activity regulation will thus not be effective in removing the factory’s incentives to under-produce. By contrast, regulation requiring the installation of elevated smokestacks would render production below the desirable-level unprofitable. Since the factory must invest $120 in prevention (an elevated smokestack) it is better off producing at the high activity level (profit of $1100) than at the low level (profit of only $1000). The insufficient activity paradigm therefore could justify the imposition of safety standards on a party even when their costs seem unjustifiable by their benefits (given the party’s existing activity level).

A second way regulation could address the problem of insufficient activity is a limitation on the harm caused by potential injurers. Returning to the polluting plant hypothetical, suppose a regulator requires the plant to eliminate the pollution it causes to nearby residents. In order to abide by such regulation, the plant has no choice but to elevate its smokestack. Once it had already invested in elevating the smokestack, strategic reduction of its production would no longer be profitable to the plant. This virtue of maximum-harm regulation can justify a highly contested interpretation the Supreme Court has given in the context of environmental protection. In American Textile Manufacturers
In Institute, Inc. v. Donovan, the Supreme Court held that employers in the cotton industry must invest in precautions assuring “that no employee will suffer material impairment of health” due to cotton dust. It was held that an employer could not be relieved from investing in a precaution that reduces potential harm to these pre-specified levels even if it showed that its costs of taking care outweigh the benefit to employees (given the plant’s level of activity). The cost-benefit analysis, it was held, had already been made by Congress when it defined the maximum harm standard.

This decision has been heavily criticized on account of its alleged lack of economic reasoning. Over the last two decades, repeated attempts to overturn this ruling have been made so that firms could be relieved of the duty to invest in a precaution if its cost outweighs its benefits.

A new case pending before the Supreme Court, Entergy Corporation v. Environmental Protection Agency, has reinforced this ongoing

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91 Id. at 509.
92 Id.
93 Id. at 504-05 (“The agency concluded that its standard is feasible because ‘compliance with [it] is well within the financial capability of the covered industries.’ We take these findings to mean … that ‘[a]t bottom, the Secretary must [and did] determine that the industry will maintain long-term profitability and competitiveness.’” Id. at n.55).
94 See, Comment, American Textile Manufacturers Institute, Inc. v. Donovan: Cost Benefit Will Survive Exposure to Cotton Dust, 17 NEW ENG. L. REV. 1345, 1370 (1981) (“Indeed, the holding in American Textile could produce a series of economically unsound regulations through OSHA rulemaking.”); Supreme Court Backs OSHA on Textile Worker Safety: ‘Cost-Benefit’ Standard Rebuffed, FACTS ON FILE WORLD NEWS DIGEST, June 26, 1981, at D2 (quoting the president of the American Textile Manufacturers Institute’s claim that the ruling went “beyond what is necessary to protect the health” of textile workers.); Merrill Hartson, THE ASSOCIATED PRESS, March 27, 1981, AM cycle (reporting how the Reagan administration had tried to convince the Supreme Court to set the regulation aside in view of President Reagan’s pledge to “reduce government regulation of business” so as to “inject new life into a stagnant economy.”); Sandra Salmans, Cotton Industry Upset by Ruling, N.Y. TIMES, June 18, 1981, at D5 (quoting industry representatives and Reagan Administration’s officials, who defended the application of plant-specific cost-benefit analysis as “an important element in achieving rational and cost-effective rulemaking.”)
95 See Linda Greenhouse, Court Sets Fall Debate on Standards of Water Act, N.Y. TIMES, April 15, 2008, at A14.
debate.96 The controversy in Entergy surrounds a provision of the Clean Water Act that applies to power plants and manufacturing facilities’ use of “cooling water” (water drawn from rivers or lakes and used to absorb heat generated by the industrial process). Both the intake of the water and its outflow can cause environmental harm. Section 316(b) of the Act provides that the design of structures used for cooling water must “reflect the best technology available for minimizing adverse environmental impact.”97 While the Environmental Protection Agency has been of the view that a plant could be relieved from investing in a precaution if its cost was significantly greater than the environmental benefits, the Court of Appeals for the Second Circuit ruled that the statute barred the agency from engaging in this type of a cost-benefit analysis.98 On appeal, the Solicitor General criticized this decision and supported the industry’s claim for a plant specific cost-benefit determination.99 In their amicus curiae brief, some of the nation’s top economists and legal academics have backed the Solicitor General’s appeal.100 The analysis in this Article shows that these decisions, which support regulation imposing maximum-harm standards, may actually have it right. A plant-specific cost-benefit evaluation could produce socially inefficient outcomes, as plants might reduce their level of activity to socially inefficient levels so as to avoid the need to invest in efficient precautions. To this extent, in order to support their argument, the critics of these decisions must show that in the contexts of the conducts under consideration insufficient activity levels are unlikely.101

96 475 F.3d 83 (2d Cir. 2007); cert. granted 128 S. Ct. 1867 (2008).
98 475 F.3d at 102.
99 See Greenhouse, supra note 95.
100 See, Brief for AEI Center for Regulatory and Market Studies and 33 Individual Economists as Amicus Curiae Supporting Petitioners, Entergy, 475 F.3d 83 (no. 08-03), 2008 WL 2817679 (supporting EPA’s case by case cost-benefit analysis, and arguing that “[a]s economists, we believe that the Second Circuit ruling . . . is economically unsound.” Id. at 5).
101 While both types of regulation can eliminate the risk of insufficient activity, maximum-harm regulation involves one significant disadvantage. If the permissible level of harm is too high, parties would still be able to limit their activity—keeping harm below the threshold—and avoid investment in desirable precaution. Maximum-harm regulation, however, has two advantages that are absent in safety standards. First, maximum-harm regulation—that grants potential
These two alternatives—regulations imposing pre-specified safety standards and maximum-harm regulations—allow legislatures flexibility in tailoring the form of regulation according to the characteristics of the particular circumstance. In some cases, it is easier for the regulator to monitor parties’ care taking, while in other cases monitoring the harm they inflict is more feasible. Enforcement of safety standards, for example, could be particularly costly when the regulated activity involves a large number of production lines and processes which need to be inspected. In such cases, monitoring of the harm inflicted by the plant could be more feasible. Conversely, when a plan utilizes only a single production line but inflicts harm through numerous outlets, monitoring of safety measures could be easier than constantly measuring the level of harm.

Inducing optimal activity through regulation—whether of safety standards or in the form of maximum-harm requirements—mandates knowledge concerning the efficiency of activity levels and possible precautions. Although legislatures are often better at collecting data than the courts, budgetary constraints limit their information-gathering capabilities. Therefore, while regulation can serve to induce optimal harm prevention in various contexts, it cannot entirely resolve the problem of insufficient activity and sub-optimal care.

\[102\] See Robert J. Jackson, Jr. & David Rosenberg, A New Model of Administrative Enforcement, 93 VA. L. REV. 1983 (1983) (stressing that with “a firm that operates multiple sources of risk, such as air-polluting smokestacks … [t]he expense of individually monitoring such sources … may consume a large share of an agency’s enforcement budget.”)

\[103\] See, e.g., Carol M. Rose, Expanding the Choices for the Global Commons: Comparing Newfangled Tradable Allowance Schemes to Old-Fashioned Common Property Regimes, 10 DUKE ENVTL. L. & POL’Y F. 45, 61 n.69 (1999) (noting that “[c]ommand-and-control regulation … often focuses on things that can be measured and monitored [such as compliance with safety standards], rather than on direct harm.”).
As noted, tort scholarship has claimed that even absent detailed information, the legal system can diminish the loss from inefficient activity by appropriately choosing among the various forms of liability. This scholarship, focusing on the risk of excessive activity, has proposed policy guidelines as to the choice between negligence and strict liability. The next section extends the traditional analysis to address the risk of insufficient activity and reassesses these guidelines. It shows that once the problem of insufficient activity is considered, the conventional policy recommendations regarding the choice between negligence and strict liability may be flipped.

C. The Choice between Liability Regimes and Insufficient Activity

As explained earlier, the conventional paradigm of optimal care and excessive activity has brought tort scholarship to propose three policy recommendations concerning the choice between negligence and strict liability. First, when harm can be avoided by being careful, because both negligence and strict liability with contributory negligence incentivize optimal care and activity, the application of either regime would result in welfare maximization. Second, where some harm is inescapable, strict liability with contributory negligence is efficient where the risk of excessive activity lies on the part of the injurer, whereas negligence is efficient if this risk lies on the side of the victim. Last, if excessive activity is possible on both sides, the legal system should follow the principle of the lesser of two evils. It should opt for the liability regime that induces excessive activity by the party whose conduct results in less social harm. Scholars have claimed that these recommendations provide “a useful guide for lawmakers to choose among liability rules.”

As the subsequent analysis suggests, however, once the overlooked risk of insufficient activity is acknowledged, these recommendations might lead to inefficient results. Judge Posner’s influential decision in *Indiana Harbor Belt Railroad v American Cyanamid* can illustrate the possible deficiency of the

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104 See *supra*, Part I.B
105 COOTER & ULEN, *supra* note 17, at 333.
first of these guidelines. The well known facts of the case involved a suit brought after a large amount of toxic material spilled from the tank car of the defendant—a chemical manufacturer. The contamination occurred on the plaintiff’s property—a small railroad company. The plaintiff sued the manufacturer to recover the costs of decontamination measures it was ordered to take by the local environmental protection agency. The original claim was based on both negligence and strict liability, yet the case reached Judge Posner on the strict liability count alone. In his decision to reject the claim, Judge Posner referred to the conventional theory concerning the relative advantage of strict liability in regulating the defendant’s level of activity:

“The baseline common law regime of tort liability is negligence. When it is a workable regime, because the hazards of an activity can be avoided by being careful, there is no need to switch to strict liability. Sometimes, however, a particular type of accident cannot be prevented by taking care but can be avoided, or its consequences minimized, by . . . reducing the scale of the activity in order to minimize the number of accidents caused by it. By making the actor strictly liable - by denying him in other words an excuse based on his inability to avoid accidents by being more careful - we give him an incentive, missing in a negligence regime, to experiment with methods of preventing accidents that involve not greater exertions of care, assumed to be futile, but instead . . . reducing the activity giving rise to the accident.”

Turning to the facts of the case, Judge Posner held that since reasonable precautions by the manufacturer could eliminate the risk

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106 Indiana Harbor Belt Railroad Co v American Cyanamid Co, 916 F.2d 1174 (7th Cir. 1990). For the wide attention that this decision has drawn, see, for example, Sykes, supra note 9, at 1912 (“Judge Posner’s opinion [in Indiana Harbor] is now standard teaching fare in torts courses around the country.”).

107 Id. at 1175.

108 Id. at 1177 (references and parentheses were omitted from the original text).
of harm, no social benefit would be provided by controlling its activity level.\textsuperscript{109} Since the standard of negligence would be sufficient to induce optimal investment, plaintiff’s claim is “not an apt case for strict liability.”\textsuperscript{110} The risk of insufficient activity, however, might have justified a different conclusion. Judge Posner’s assumption concerning the efficiency of negligence disregards the possible incentives of potential injurers to strategically set their activity below the efficient level. Precautions might be cost-effective when deliveries are frequent (and thus the risk of harm is substantial), but inefficient if the car tank is used only occasionally (where the risk is small). Subjecting manufactures to the standard of negligence could therefore induce them to inefficiently limit their use of car tanks so as to avoid socially desirable investments in prevention. Stated more generally, even when injurers’ efficient precaution would entirely prevent the risk of harm, imposing strict liability might be necessary to discourage them from attempting to escape the duty of care by maintaining an inefficiently low level of activity. In cases like \textit{Indiana Harbor}, where precaution appears to require investments on the part of the potential injurer (the manufacturer), strict liability is thus superior. Conversely, in contexts where optimal precaution mandates investment by the victim, only negligence (that makes the victim bear all the harm) would remove the risk of insufficient activity and sub-optimal care.

The risk of insufficient activity may also require reassessment of the conventional recommendations concerning cases in which precautions do not entirely eliminate the risk of harm. Recall that tort theory has stressed that in such circumstances—where optimal precaution does not render parties’ conduct entirely safe—parties might choose to engage \textit{excessively} in their activities. Aiming to minimize the risk of such behavior, tort theory has proposed policy recommendations concerning the choice of liability regimes. Yet, as the preceding analysis has shown, parties may in fact pursue the opposite strategy of insufficient activity. The selection of the appropriate liability regime might thus be necessary to discourage not only excessive but also insufficient activity levels.

\textsuperscript{109} \textit{Id.} at 1181.
\textsuperscript{110} \textit{Id.}
A recent illustrative example can be found in the proposed new Restatement of Torts. The Restatement establishes negligence as the general standard of liability, but provides that “abnormally dangerous” activities are governed by the standard of strict liability. The application of strict liability in the context of abnormally dangerous activities is attributed to the risk that the conventional rule of negligence might be ineffective in discouraging excessive conduct by injurers. As the drafters explain, “certain choices the defendant makes in the course of the activity in fact may be negligent, yet may lurk so far in the background as to elude the attention of courts in negligence cases. Among these are the choices as to the exact level at which the activity is conducted.” Consequently, “under negligence law standing alone it is possible that a defendant who unreasonably engages in an activity will escape liability.” The Restatement thus concludes that in contexts in which excessive activity by the injurers involves a risk of substantial harm—such as abnormally dangerous activities—strict liability (with the defense of contributory negligence) should be preferred over negligence.

The Restatement, while highlighting the risk of excessive conduct, does not address the alternative danger of insufficient activity. As the preceding analysis has demonstrated, negligence may induce injurers to set their activities not only above but also below the efficient level. To this extent, the Restatement’s approach advocating the application of strict liability only in cases in which injurers might over-engage in their activity is too narrow. In contexts in which injurers may elect insufficient activity, only the application of strict liability will incentivize them to adopt optimal levels of care and activity. Abnormally dangerous activities therefore constitute only one category of cases where it is appropriate to depart from the conventional standard of negligence. With such activities, the application of strict liability is grounded in the need to discourage excessive conduct. In other contexts, strict liability might be required to discourage injurers from adopting insufficient activity levels and investing in sub-optimal care.

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112 Id., § 20 cmt. b.
113 Id.
Finally, consider the third guideline of the conventional literature, addressing the case where the care and activity levels of both the injurer and the victim affect potential harm. Recall that both negligence and strict liability with contributory negligence induce optimal precautions but encourage an efficient activity level by only one of the parties. Tort theory has thus recommended applying the principle of the lesser of two evils; according to this principle, the legal system should opt for the regime that induces excessive activity by the party whose conduct results in less social waste.\textsuperscript{114} This conclusion is based on the literature’s assumption that excessive activity is the only possible distortion. It overlooks, however, the risk of insufficient activity. Given the latter possibility, minimization of social waste in fact requires a comparison not merely of two evils, but rather of four evils: the possible loss from both parties’ excessive as well as insufficient activity levels. Three possible scenarios may thus arise. First, if the only relevant concern is excessive activity by both the injurer and the victim, then the social waste caused by these two distortions should be compared when deciding on the desirable regime. Second, if the fear is from insufficient activity by both parties, the relative expected harm caused by the insufficient activity of each party is to be balanced. Finally, when the expectation is that one of the parties would engage in excessive activity and the other would prefer insufficient activity, the damage from the first party’s excessive activity should be compared with the harm caused by the second party’s insufficient activity.

The possible combinations of excessive and insufficient activity levels can be illustrated by reconsidering the railroad-farmer hypothetical. In \textit{Hypothetical 1}, where the cost of parties’ precaution is the same per unit, the only possible risk is of excessive activity levels. In this case, as tort scholarship has recommended, determining the efficient liability regime requires balancing the expected loss from each of the parties’ excessive activity. If the railroad’s excessive activity is less harmful than excessive activity by the farmer, negligence should be preferred. If, on the other hand, the railroad’s excessive activity is believed to be more socially wasteful, strict liability with contributory negligence ought to be preferred. But this conclusion may be wrong if one of the parties (or both) prefer

\textsuperscript{114} See \textit{supra} text accompanying notes 38-40.
insufficient, rather than excessive, activity. Imagine that the cost of the farmer’s precaution is the same per each unit of activity (such as the fire-resistant spray in Hypothetical 1) but the railroad’s precaution requires a fixed cost investment (as the spark arrester in Hypothetical 2). In this case, while the farmer’s conduct can be excessive, the railroad might actually prefer insufficient activity. To minimize social waste, it is necessary to compare the loss from the farmer's excessive activity with the harm from the railroad's insufficient activity. Similarly, suppose that both parties’ precautions involve fixed cost investment (as in Hypothetical 2). Here, both parties might prefer insufficient rather than excessive activity. Accordingly, the decision-maker should apply the regime that induces the less harmful insufficient activity.

Legal scholarship has explored the wide implications that excessive activity levels may have on the creation of inefficient risks across many tort-related contexts. Accordingly, rich literature has demonstrated the importance of the differences between strict liability and negligence in regulating parties’ behavior. Yet, socially undesirable risks can also be created by insufficient activity levels. The preceding analysis thus suggests that the appropriate selection of liability regimes has even greater practical importance than traditionally perceived.

CONCLUSION

Conventional wisdom in tort law maintains that the prevention of undesirable risks mandates restriction of potentially harmful conduct. Against this widely held conviction, this Article shows that undesirable risks often stem from insufficient activity. When subject to negligence-based regimes, parties might strategically under-engage in their harmful behavior so as to avoid efficient investment in precautions. In such cases, social waste results not from the excessive, but rather from the limited intensity in which harmful activities are carried out.

115 See supra note 1.
The preceding analysis demonstrates that the legal system may discourage parties from setting their conduct below the desirable level either through the imposition of liability or the use of regulation. Under the former possibility, courts can provide incentives for optimal prevention by extending the conventional negligence standard. This extension involves the imposition of a new form of liability—liability for harm stemming from insufficient activity.\textsuperscript{116} When the imposition of such liability is unfeasible, legislatures may minimize social waste by applying negligence in cases in which traditional analysis has assumed strict liability to be superior (and vice versa).\textsuperscript{117} Alternatively, the legal system may induce optimal prevention by setting appropriate regulation. Whereas the conventional account has often endorsed the application of maximum-activity regulation to control parties’ activity levels, the overlooked paradigm of insufficient activity commands the application of two other regulatory frameworks. To remove parties’ incentives to undesirably restrict their activity, regulation can either dictate investment in pre-specified safety measures or impose ceilings regarding the maximum level of harm.\textsuperscript{118} Furthermore, the overlooked paradigm indicates that the scope of regulation advocated by the conventional account is too restrictive. Regulation might be needed not only because parties may engage excessively in their conduct, but also to ensure that parties will engage in their activity to a sufficient extent.\textsuperscript{119} While this Article focuses on liability and regulation, its insights bear on other legal mechanisms similarly designed to guide behavior. Liability and regulation both constitute “sticks” that impose limitations on parties’ actions. Yet the legal system may influence behavior also by granting “carrots,” in the form of direct and indirect subsidies. Under the conventional approach, subsidies should be primarily granted to support activities that result in positive externalities, that is, “whenever the behavior of one party makes

\textsuperscript{116} See supra text accompanying notes 67 -78.\textsuperscript{117} See supra text accompanying notes 105-110.\textsuperscript{118} For the discussion concerning the inefficiency of maximum-activity regulation and the advantages of safety standards and maximum harm regulation in solving the risk of insufficient activity levels, see supra text accompanying notes 91-103.\textsuperscript{119} See supra text accompanying note 89.
another party better off but the first party does not receive the benefits of doing so." The sub-optimal care and insufficient activity paradigm shows, however, that this perception might be too narrow. In appropriate cases, it may be desirable to encourage parties through subsidies to increase the level of their activity even if such activity does not involve any positive externalities but instead inflicts harm on others. Inducing parties to increase their level of activity may render investment in precautions cost-effective. By granting subsidies, it is thus possible to stimulate parties not only to produce more but also to take greater care. The social benefit derived from the combination of these two effects may be well beyond the benefit derived from subsidizing activities with high positive externalities.

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120 Lily L. Batchelder et. al., Efficiency and Tax Incentives: The Case for Refundable Tax Credits, 59 STAN. L. REV. 23, 44 (2006); Note: Functional Analysis, Subsidies, and the Dormant Commerce Clause, 110 HARV. L. REV. 1537, 1547 (1997) (arguing that subsidies are justified only when a firm produces a positive externality, and not when it produces an offsetting negative externality); Christopher J. Coyne & Peter T. Lees, Who's to Protect Cyberspace?, 1 J.L. ECON. & POL'Y 473, 478 (2005) ("In the case of negative externalities, government usually penalizes the behavior, while in the case of positive externalities it usually encourages the behavior through subsidies or other incentives.")

121 Imagine, for example, two plants: X and Y. Assume that plant X's production is harmless. Assume further that the production of plan X provides the plant a private benefit of $300 and also results in a positive externality of $200, for a total social benefit of $500. In contrast, suppose the production of plant Y is not harm-free and does not provide any positive externality: While it provides the plant a private benefit of $1000, it inflicts harm of $800 on its neighbors. Finally, suppose that plant Y may prevent harm by investing in a higher smokestack at a cost of $1050. Since a higher smokestack is not cost-justified ($1050 > $800), the plant has no duty to invest in precaution; plant Y's production thus results in net social benefit of only $200 ($1000 – $800). Imagine that a subsidy in the amount of $75 may be given to either plant conditioned upon the recipient plant doubling its production. At first blush, given its positive externality and the higher net value of its activity ($500 > $200), it appears more desirable to provide such support to plant X. This conclusion, however, is false. Doubling the production of plant X will increase social welfare by $500. Doubling the production of plant Y will increase its benefit from $1000 to $2000 and the harm it inflicts from $800 to $1600. Under this higher level of production, a higher smokestack becomes cost effective ($1600 > $1050), and plant Y will have to prevent the harm to avoid liability. Given these higher levels of activity and care, the net social benefit from plant Y’s production increases to $950 ($2000 – $1050). Therefore, although plant X’s production is harmless and provides a positive externality, it is socially more desirable to grant the subsidy to plant Y. Subsidizing plant X involves an increase
Be it with carrots (subsidies) or with sticks (liability and regulation), the legal system must account for the overlooked paradigm of sub-optimal care and insufficient activity. By applying any of the suggested policy tools, the legal system will increase the overall level of socially beneficial activities while also providing potential victims with better protection.
Appendix:

Suppose the level of harm inflicted by an injurer is $H(z,x)$, where $z$ is the injurer's level of activity and $x(z)$ is his expenditure on care. In addition, $\frac{\partial H}{\partial z} > 0$, $\frac{\partial^2 H}{\partial z^2} \geq 0$, $\frac{\partial H}{\partial x} < 0$, $\frac{\partial^2 H}{\partial x^2} > 0$, $\frac{dx}{dz} \geq 0$, $\frac{\partial^3 x}{\partial z^2} \geq 0$.

The injurer is considered negligent if, given his level of activity $z$, he did not choose $x$ so as to minimize:

$H(z,x)+x(z)$

That is, given the injurer’s activity, the standard of care that meets the negligence standard is defined by $x^*$, which satisfies:

$x^* : \frac{\partial}{\partial x} (H(z,x) + x) = 0$  \hspace{1cm} (A1)

Accordingly, the injurer will spend $x^*$ on care and will not be found negligent. The injurer's profit is therefore:

$U(z,x) \equiv u(z) - x^*(z)$

Where $u(z)$ is the injurer's profit (ignoring the costs of precaution), and $\frac{\partial u}{\partial z} > 0$, $\frac{\partial^2 u}{\partial z^2} < 0$.

Social welfare equals:

$W(z,x) \equiv u(z) - x^*(z) - H(x,z)$

\textsuperscript{122} To see why, note that for any level of $z$, the injurer can earn more profits by taking due care and making $u(z) - x^*(z)$ than taking less than due care and making $u(z) - x(z) - H(z,x)$. Any cost savings the injurer could make by taking less care would be more than offset by the additional harm that would result, since by definition, $x^*(z)$ minimizes $x(z) + H(z,x)$. 

\textit{Negligence and Insufficient Activity}
The activity level $z^{opt}$ that maximizes welfare is derived by:

$$\frac{dW(z,x)}{dz} = \frac{du(z)}{dz} - \frac{dx^*(z)}{dz} - \frac{dH(x^*,z)}{dz} = 0 \quad (A2)$$

The injurer will prefer socially excessive activity (activity exceeding $z^{opt}$) if and only if at activity $z^{opt}$ and care of $x^*(z^{opt})$:

$$\frac{du(z)}{dz} - \frac{dx^*(z)}{dz} > 0 \quad (i.e., \text{the injurer would increase his profits by raising } z \text{ above } z^{opt}).$$

Due to A2, this occurs if and only if at the point $(z^{opt}, x^*(z^{opt}))$:

$$\frac{dH(x^*,z)}{dz} > 0.$$

That is, excessive activity occurs if and only if at the point of optimal activity and care, raising activity above the socially optimal level (and taking the appropriate additional care warranted by the increase in activity) causes an increase in the level of harm.

Conversely, the injurer will prefer socially insufficient activity (activity below $z^{opt}$) if and only if at the point $(z^{opt}, x^*(z^{opt}))$:

$$\frac{du(z)}{dz} - \frac{dx^*(z)}{dz} < 0 \quad (i.e., \text{the injurer would increase his profits by setting } z \text{ below } z^{opt})$$

Due to A2, this occurs if and only if at the point $(z^{opt}, x^*(z^{opt}))$:

$$\frac{dH(x^*,z)}{dz} < 0.$$

That is, insufficient activity occurs if and only if at the socially optimal activity level, an increase in activity reduces the level of harm, due to the additional precautions mandated by increased activity.

Note that:

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123 Note that because the injurer would engage in socially excessive activity, he also elects socially excessive care (the $x^*$ required by $z^{opt}$ is above $x^*(z^{opt})$).
\[
\frac{dH(x^*, z)}{d(z)} = \frac{\partial H(x^*, z)}{\partial (z)} + \frac{\partial H(x^*, z)}{\partial (x^*)} \frac{dx^*}{dz} \tag{A3}
\]

That is, an increase in activity affects the level of harm in two opposite ways. On the one hand, the first term in A3 shows how, keeping the injurer's level of care fixed, an increase in activity raises harm (given \(x^*(z), \frac{\partial H(x^*, z)}{\partial z} > 0 \)). On the other hand, the second term in A3 demonstrates how an increase in activity also raises the injurer's required expenditure on care, and this, in and of itself, reduces harm (given \(z, \frac{\partial H(x^*, z)}{\partial x^*} \frac{dx^*}{dz} < 0 \)).